

Sales Figures

15 Manufacturers Ship 206,019 Household Units in July to Distributors and Dealers

The following 15 member companies of the Refrigeration Division of the National Electrical Manufacturers Association (Nema) reported household refrigerator sales for July, 1936: Apex Electrical Mfg. Co., Crosley Radio Corp., Fairbanks, Morse & Co., Frigidaire Corp., General Electric Co., Gibson Electric Refrigeration Co., Kelvinator Corp., Leonard Refrigerator Co., Norge Corp., Servel, Inc. (export only), Stewart-Warner Corp., Sunbeam Electric Mfg. Co., Uniflow Mfg. Co., Uni-

versal Cooler Corp., and Westinghouse Electric & Mfg. Co. Member companies not reporting included: Jomoco, Inc., Merchant & Evans Co., and Sparks-Withington Co.

The sales of the reporting companies do, however, include units manufactured for the following concerns: Major Appliance Corp., Montgomery Ward & Co., Potter Refrigerator Corp., and Sears, Roebuck & Co.

SALES FOR JULY, 1936					
Lacquer (Exterior) Cabinets Complete		Domestic		Canadian	
Quantity	Value	Quantity	Value	Quantity	Value
1. Chest	2,741	124,300	32	1,553	8,830
2. Less than 3 cu. ft.	45	2,728	1	9	463
3. 3 to 3.99 cu. ft.	6,281	362,253	110	6,240	1,634
4. 4 to 4.99 cu. ft.	29,754	1,942,379	774	51,200	5,454
5. 5 to 5.99 cu. ft.	43,069	3,263,515	749	60,095	2,870
6. 6 to 6.99 cu. ft.	63,269	4,976,203	139	12,066	1,362
7. 7 to 7.99 cu. ft.	11,052	1,164,271	211	24,003	798
8. 8 to 8.99 cu. ft.	3,591	354,040	2	202	65
9. 9 to 9.99 cu. ft.	60	10,886	1	3	473
10. 10 to 10.99 cu. ft.	8	1,666	1	3	473
11. 13 cu. ft. and up	8	1,666	1	3	473
11. Total Lacquer	159,870	12,202,241	2,017	155,359	12,367
Porcelain (Exterior) Cabinets Complete					
12. Up to 4.99 cu. ft.	1,023	76,874	54	4,405	258
13. 5 to 5.99 cu. ft.	4,742	404,875	67	5,820	779
14. 6 to 6.99 cu. ft.	9,404	887,091	27	2,604	233
15. 7 to 7.99 cu. ft.	4,638	518,333	20	2,230	179
16. 8 to 8.99 cu. ft.	2,850	369,279	10	1,193	129
17. 9 to 9.99 cu. ft.	502	85,485	2	338	107
18. 10 to 10.99 cu. ft.	442	102,615	1	210	69
19. Total Porcelain	23,601	2,444,352	181	16,800	1,754
20. Total—Lines 11 and 19	183,471	14,646,593	2,198	172,159	14,121
21. Separate Systems	2,921	138,244	2,696	113,394
22. Separate Household Evaporators	247	4,883	30	401	6,643
23. Total—Lines 20, 21, 22	186,639	2,228	17,152
24. Condensing Units	635	39,586	32	1,869	328
25. Cabinets—No Systems	1,258	31,031	797	19,732
26. Total Household	\$14,860,337	\$174,429
27. Total Commercial and Air-Conditioning
28. Total Lines 1, 2, 4, 6, 8, and 27
29. Commercial Evaporators (Not Reported Above)	4,936	141,874	158	5,969	1,709
30. Air-Conditioning Evaporators (Not Reported Above)	132	26,958	6	3,000
31. Total Commercial & Air Conditioning	\$3,233,645	\$34,095
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25,556 Commercial and Air-Conditioning Condensing Units Sold in July by 15 Manufacturers

The following report of commercial refrigerating and air-conditioning equipment sales for July, 1936, were made to the Commercial Refrigeration Section of the Refrigeration Division of the National Electrical Manufacturers Association (Nema) by the following 15 companies:

Brunner Manufacturing Co., Carrier Engineering Corp., Crosley Radio Corp., Frigidaire Corp., General Electric Co., Gibson Electric Refrigeration Corp., Kelvinator Corp., Leonard Refrigerator Co., Norge Corp., Servel, Inc., Stewart-Warner Corp., Sunbeam Electric Mfg. Co., Uniflow Manufacturing Co., Universal Cooler Corp., Westinghouse Electric & Mfg. Co., York Ice Machinery Corp.

SALES FOR JULY, 1936					
Domestic		Canadian		Other Foreign	
Quantity	Value	Quantity	Value	Quantity	Value
1. Bottle Water Coolers—Complete	758	\$ 80,837	5	\$ 417
2. Pressure Water Coolers—Complete	3,013	322,958	9	862
3. Water Coolers—Low Side Only	127	8,200	1	46
4. Ice Cream Cabinets—Complete	1,993	279,084	47	4,862	242
5. Ice Cream Holding Cab. Only (Remote)	604	84,626	14	1,711	13
6. Bottled Beverage Coolers—Complete	4,137	294,109	50	3,471	44
7. Milk Cooling Cabinets (No High Sides)	227	17,471
8. Air Conditioners—Self-Contained	1,404	278,332	1	261	100
9. Air Conditioners—Floor Type (No High Sides)	519	118,486
10. Air Conditioners—Ceiling (Cooling Only—No High Sides)	363	59,229	2	865	45
11. Air Conditioners—Ceiling Type (Equipped for Heating—No High Sides)	62	36,583
12. Air Conditioners—Residential Type (No High Sides, Boilers, or Furnaces)	162	26,973
13. Condensing Units—Less Than 1/2 Hp.	2,410	123,850	45	2,884	1,118
14. Condensing Units—1/2 Hp.	2,437	190,901	29	2,336	544
15. Condensing Units—3/4 Hp.	2,161	205,136	29	3,183	349
16. Condensing Units—1 Hp.	1,423	173,359	16	2,297	160
17. Condensing Units—1 1/2 Hp.	1,044	152,607	11	1,886	77
18. Condensing Units—2 Hp.	583	115,250	5	996	48
19. Condensing Units—3 Hp.	231	54,331	2	458	30
20. Condensing Units—5 Hp.	331	88,048	2	421	13
21. Condensing Units—7 1/2 Hp.	175	81,927	4	1,190	7
22. Condensing Units—10 Hp.	93	56,607
23. Condensing Units—15 Hp.	83	61,158
24. Condensing Units—20 Hp.	62	54,432
25. Condensing Units—25 Hp.	45	51,688
26. Condensing Units—30 Hp.	36	68,631
27. Total Lines 13 to 26 Inclusive	11,114	143	2,364	13,631
28. Total Lines 1, 2, 4, 6, 8, and 27	22,449	255	2,852	25,556
29. Commercial Evaporators (Not Reported Above)	4,936	141,874	158	5,969	1,709
30. Air-Conditioning Evaporators (Not Reported Above)	132	26,958	6	3,000
31. Total Commercial & Air Conditioning	\$3,233,645	\$34,095
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Plan Book Gives Data On Housewares Plan For Oct. & Dec.

NEW YORK CITY—A plan book, containing instructions for two national promotions of electrical housewares, "Electric Buffet Service Month" in October, and the "Second National Electric Housewares Week" Dec. 7-12, has been released by the Electrical Housewares Program committee.

Sponsored by Edison Electric Institute and 12 manufacturers of electrical equipment, the first promotion, Buffet Month, is aimed at the party market, which the plan book explains in detail; the second is designed to exploit the Christmas gift market.

Market for electrical housewares items, which include all small table appliances such as toasters, roasters, grills, waffle irons, and chafing dishes, is today far from saturation, the plan book tells dealers. Frequently the complete utility of the appliance has not been sold to its owner, or the

appliance may be obsolete or out of repair.

The popularity of the buffet service for informal luncheons, midnight snacks, and after-the-game celebrations will be emphasized in stickers, broadsides, newspaper mats, news releases, and radio announcements.

Cash prizes totaling \$300 will be given for the best displays, either window or interior, to contestants in each of three divisions: department store, utility, and dealer classes. In addition, a prize of \$100 will be given to the jobber who submits the largest number of photographs of contest displays.

Electrical Housewares Week, set for a time when everyone is preparing Christmas shopping lists, will also feature a display contest for utility companies, department stores, and electrical housewares dealers, with six-day all-expense cruises to Bermuda for the winners.

An additional prize of \$100 will also be awarded in this contest to the electrical jobber submitting window or interior displays by the largest number of utility companies, departmentalized stores, and other dealers in his territory.

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DETROIT, MICHIGAN, SEPTEMBER 9, 1936

Copyright, 1936, by
Business News Pub. Co.THREE DOLLARS PER YEAR
25 CENTS PER COPY**Gain in Industry
Employment Is
Shown in Survey****Many Refrigeration Firms
And Parts Makers Are
Above 1929 Marks**

NEW YORK CITY—Notable gains in employment over 1929 figures are shown by several manufacturers in the refrigeration and air-conditioning industry, according to a nation-wide survey of employment by the *New York Sun*, published last week.

Kelvinator Corp., Servel, Inc., and Norge Corp. accounted for three of the largest increases in the refrigeration field. Kelvinator's average employment for the year 1935 rose to 6,622, almost doubling the 3,326 average employment for 1929.

Servel more than doubled its 1929 employment mark, showing an average of 4,500 employees for 1935, as compared with a 2,000 average in 1929.

Employment at Norge Corp.'s Muskegon plant last year averaged 3,008 workers; the 1929 average at the plant was only 300.

Trane Co., York Ice Machinery Corp., Williams Oil-O-Matic, Minneapolis-Honeywell, Universal Cooler, Sunbeam, Apex, and Curtis were other manufacturers showing employment gains in the six-year period. Carrier, Sturtevant, Fedders, Frick, Puffer-Hubbard, and Sparks-Withington are

(Concluded on Page 2, Column 4)

**Value of Conditioner
Orders in July Only
4% Below June Peak**

WASHINGTON, D. C.—Value of orders booked for air-conditioning systems and equipment during July amounted to \$4,155,853, according to statistics covering 98 manufacturers released last week by Director William L. Austin of the Bureau of the Census.

July orders were 4.2% below the \$4,336,636 worth of equipment sold by the same manufacturers during June, which were in turn slightly lower than the \$4,412,681 in orders booked during May, the year's high month.

Air-conditioning equipment orders booked during the seven-month period total \$24,572,299. Of this amount, \$12,185,379 is in the air-conditioning group, \$7,866,066 in fans, and \$4,520,854 in unit heaters.

With the exception of humidifiers, all equipment in the air-conditioning group showed a decline in sales during the month. Humidifier sales rose to \$101,552, from a June total of \$82,323. May sales in this group had been \$65,395.

Unit air-conditioning systems, both self-contained and otherwise, showed rather marked declines during the period. Self-contained unit sales dropped to \$321,844 from a June total of \$479,685; sales in the not self-contained classification fell to \$678,146, from a June figure of \$763,884.

Central station systems for human comfort totaled \$408,283, falling off from a June total of \$536,745. Industrial systems, however, showed a gain, the \$49,040 in orders being a considerable rise as compared with sales of \$23,430 during June. May sales in this classification were \$25,091.

Air washer orders were down for the month, \$65,738 in sales being reported against \$87,970 during June. Sales of air filters dropped slightly, being \$11,648 compared with \$12,430 during June.

Indications of the probable buying trend during the next few months were evident in the July sales in the unit heater and fan groups as reported by the 98 companies.

In the fan group, July orders totaled \$1,631,666, against a \$1,374,015 total during June. Orders booked for unit heaters reached a total of \$763,355, compared with \$626,075 during June, and a gain of almost \$200,000 over the \$563,990 in orders for this type of equipment booked during May.

Features of the Tenth Anniversary Number

1. "Development of the American Household Electric Refrigeration Industry." Pages 4, 6, 8, 10, 12, 14, and 16.

Complete text of the original draft of the paper prepared by Editor George Taubeneck for the 1936 World Congress of Refrigeration at The Hague, Holland. The paper presented to the Congress had to be cut to one-fourth the size of the original draft.

2. "Volume Selling at Low Marginal Prices Is Basis of Department Stores' 10 Years in Refrigeration." Pages 11, 13, 15, and 17.

The story of the part department stores have played in merchandising electric refrigerators, and the various trends their merchandising policies have taken.

3. "Utilities Capitalize on Double Profit-Building Possibilities in Selling Refrigeration." Pages 17, 18, and 19.

Review of the contribution which operating power companies have made to the development of the household electric refrigerator industry.

A 10-Year History of the Industry

4. "Calendar of the Electric Refrigeration Industry's Decade of Greatest Progress—1926 to 1936." Pages 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31, 32, 33, and 34.

Dated story of the industry's growth in terms of men, products, and methods, as recorded in the pages of *ELECTRIC REFRIGERATION NEWS* over a 10-year period.

5. "Morse Traces Development of Refrigerating Machinery Using Freon-12." Pages 35, 36, and 37.

York Ice Machinery Corp.'s executive engineer outlines the problems and methods used in designing compressors for a new type of refrigerant.

6. "Muffy Explains Need for and Use of Standard Rating and Testing Methods." Pages 38 and 39.

Head of A.S.R.E.'s standards committee tells why new standards were needed and how test and rating methods should be applied.

7. Digest of Technical Papers Presented at the World Congress by Refrigeration Experts from Many Countries. Pages 42, 43, 44, and 45.

A continuation of the series of digests of important documents on refrigeration research made public at The Hague.

More Historical Issues to Come**Industry Pioneer Number, Oct. 7**

A tribute to the individuals who have pioneered in the development of the refrigeration and air-conditioning industry.

Considerable information has already been contributed for this feature (originally scheduled for the Tenth Anniversary Number). Readers are urged to send in all available data in order that this record may serve as a reference for all who seek authentic background information about the industry.

Product Development Number, Nov. 4

A survey of the significant improvements in refrigeration and air-conditioning equipment, parts, materials and supplies.

Readers are invited to send photographs and data showing the progressive steps in the development of products now in commercial use and records of pioneering efforts which foreshadowed present engineering practice.

Foreign Trade Number, Dec. 2

An appraisal of the present foreign market for refrigeration and air conditioning and its future opportunities.

Air Conditioning Number, Jan. 6

An analysis of the accomplishment to date in selling air conditioning to the public, with discussions of the industry's problems by leaders in the field.

**New Westinghouse
Building Nears
Completion**

MANSFIELD—Simplicity of design is coupled with many new building features, chief among which is air conditioning, in the new warehousing and office building which Westinghouse Electric & Mfg. Co. is constructing to house its merchandising division here. The building is expected to be ready for occupancy next month.

Triangular in shape, with the sides of the right angle 320 by 330 ft., the building will have approximately 305,000 sq. ft. of floor space. It will be 102 ft., or seven stories, high, but will have only five floors—the two first floors having 24-ft. ceilings for warehousing purposes. Floor space on each floor will be approximately 60,000 sq. ft.

The fifth floor, with an inside ceiling of 12 ft., will be devoted to executive offices for sales, advertising, sales promotion, and accounting departments. In addition, there will be a large display room, eight smaller display rooms, and facilities for a Home Economics Institute.

Main entrance will be on the north side of the building, facing the present warehouse. It will be of modern design of aluminum and black Carrara glass. Entrance and passage way open into a ground floor foyer, modernistically designed, with walls and ceiling of black Carrara glass, finished with aluminum trim, and floors of specially designed terrazzo.

The large display room, measuring 60 by 80 ft., will be used for the display of larger apparatus and merchandise, as well as for an assembly room for special meetings. The room will be fitted with a stage for displaying merchandise, and will have theatrical lighting effects, a screen, and sound apparatus for talking pictures.

At the rear of the large display room will be located space for the Domestic Science Institute, which will be used to train economists and specialists interested in household economics.

One hundred and twenty-five tons of refrigeration equipment will furnish conditioned air for distribution throughout the working areas. Cooling equipment consists of six compressors, four of which will be 25 tons and two 15 tons capacity. Two of the units will be located for easy inspection by interested visitors.

**Ice Companies Sell 60%
Of Ice Boxes in '35-'36**

CHICAGO—Ice companies continue to be the leading retailers of ice refrigerators, according to figures for the year ended July 31, 1936, released by Secretary E. G. Vail of National Refrigerator Manufacturers Association.

Ice companies purchased 218,859, or approximately 60% of the 367,261 units sold during the year. The remainder went to furniture, hardware, and department stores.

Sales to ice companies showed a 37.7% gain in dollar volume over the previous year; the increase in dollar volume for the industry as a whole was 15.8%.

Increase in actual number of sales was 5.1% over the previous year.

**G-E Supply Corp. Buys
Thompson-Sterling Co.**

LOUISVILLE — General Electric Supply Corp., with district offices here, has purchased the assets of Thompson-Sterling Co., electrical supply company, and will sell all products formerly handled by that organization, it was announced last week.

M. E. Brown has been appointed manager of the new Louisville district office, serving Kentucky, southern Indiana, and southwest Virginia. R. E. Cumming is operating manager; W. S. Ball, supply sales manager; R. E. Kaiser, appliance sales manager; and J. A. Warren, credit manager.

**Kelvinator Corp.
Plans \$600,000
Plant Addition****Two New Buildings to Add
304,000 Sq. Ft. to
Detroit Factory**

DETROIT—Announcement of a \$600,000 expansion program, to permit greater efficiency of operation and a 25% increase in capacity, was made this week by George W. Mason, president and chairman of the board of Kelvinator Corp.

Construction of two new buildings will add 304,000 sq. ft. of floor space to Kelvinator's main plant on Plymouth Road near Schaefer Highway, Mr. Mason said. One of the buildings of one-story construction will be 440 by 560 ft., making 246,400 sq. ft. available. The other, two stories high and 80 by 360 ft., will have 57,600 sq. ft. of space.

Both buildings will be of brick, reinforced by steel, and will have a large amount of window space.

In constructing the new addition 1,000 tons of steel, 5,000 yards of concrete, and 40,000 sq. ft. of glass will be used. Employment will be provided for 500 men for a period of three months, it is estimated. Contract for the construction work has been let to O. W. Burke, Detroit general contractor.

Construction will start at once, and is expected to be completed within three months. The buildings were designed by Albert Kahn, Detroit architect, and will form an integral part of Kelvinator's production system.

Built so that they may be used for a variety of purposes, the buildings will provide a flexibility unusual even in the present advanced stage of factory planning and design, in the opinion of company officials.

Contemplated construction will permit a consolidation of operations. More space will be provided for the manufacture of domestic refrigerators. One entire building will be made available for air-conditioning products, and another for the manufacture of ice cream cabinets.

Part of the new addition will be used for warehousing, and is expected to effect a considerable saving through reduction in rentals of outside property. Because of the seasonal character of electric refrigeration, warehousing is necessary to smooth out the peaks of employment; in the past, Kelvinator has leased outside property for this purpose. Now a large part of this can be taken care of on its own property.

One floor of the new building will be used to facilitate handling of refrigeration equipment for export, Mr. Mason said. This part of the company's business has been increasing recently, and the addition will enable the work to be handled under one roof. Second floor of the building will be used for assembly of domestic units.

(Concluded on Page 2, Column 5)

**McCray Employes to Share
In Company Profits**

KENDALLVILLE, Ind.—A profit-sharing plan for all McCray Refrigerator Co. employes, including plant workers, office employes, and executives, was announced last week by President E. E. McCray.

Under the plan, the several hundred employes of the company will share in each \$10,000 of profit over and above the amount needed to meet dividend requirements. For all employes except executives, profit-sharing will be at the rate of 2½% of their year's wages for every \$100,000 of net profit earned above dividend needs.

For executives, salary base rates are kept low, but provision is made for sharing profits so that the amount of annual income is directly dependent upon the company's progress and accomplishments.

The plan was devised by Trundle Engineering Co., Cleveland.

Household Products 6-Month Volume Largest Since 1929, Survey Shows

NEW YORK CITY—Household products manufacturers as a group transacted a larger volume of business in the first half of the current year than in any similar period since 1929, states the current issue of *Standard Trade & Securities*, a publication of Standard Statistics Co., Inc.

"Sales of a number of electric appliance lines, including refrigerators and washing machines, set new high records for the period, while volume in virtually all divisions ran substantially ahead of 1935 first half levels," the bulletin says.

Higher Production Costs

Higher production costs, without compensating adjustments in selling prices, held the gain in aggregate operating returns to relatively moderate proportions, it is asserted. Reported income statements covering the six months ended June 30 have revealed a marked variance in returns, not only of the different divisions, but also of individual companies in the same field.

Factory shipments of electric household refrigerators, the bulletin says, reached a new all-time high for the first six months of 1936, totaling 1,516,000 units, an increase of 29% over the 1,178,000 units sold in the like 1935 interval.

If the same percentage gain is maintained in the last six months (which is entirely possible, the bulletin says, in view of recent high summer temperatures and better economic conditions) full year shipments would approximate 2,250,000 units. Increased tooling expenses have offset some of the benefit of increased volume, but full year manufacturers' profits will be well above 1935 levels, it is predicted.

Recent trade developments, the bulletin observes, indicate that operating returns of semi-luxury household products for the final half of 1935 will make considerably more favorable comparisons with year-earlier figures than those of the initial six months. With consumer purchasing power bolstered by the soldiers' bonus and home building activity expanding, trade interests expect the best fall business in several years, it is stated.

Inventories Reduced

Since an unusually active summer retail trade has reduced dealer and distributor stocks to generally low levels, the prospective increased consumer demand should be fully reflected in manufacturers' operations, the bulletin forecasts. The sound inventory position should also result in a generally firm price structure, and may permit needed advances in certain lines, it adds.

Combination of larger volumes and more satisfactory unit returns should spell marked profit gains, especially since production costs are expected to remain relatively stable, according to the survey.

Two mechanical refrigerator manufacturers, Kelvinator and Servel, and two ice companies, American Ice and City Ice & Fuel, are surveyed in the publication.

Report on Kelvinator

Of Kelvinator, the bulletin says: "Sales for the first 10 months of the current fiscal year (to end Sept. 30) showed substantial gains over year-earlier levels. Profits for the final three months of the year doubtless will be seasonally below the third quarter level of \$0.77 a share, but

full year earnings should approximate \$1.55 a share, against \$1.05 a share in the preceding 12 months. Another extra, to supplement the regular \$0.50 annual dividend rate, is possible before the close of the calendar year."

Servel: "Earnings registered marked seasonal improvement in the May July period, bringing profit for the first nine months of the current fiscal year to \$2.11 a share, or more than double that for a like interval a year earlier. Although sales probably will decline rather sharply during coming months, returns for the full 12 months to Oct. 31 should approximate \$2.30 a share, justifying larger dividend payments."

2 More Kelvinator Men Win Havana Trips

DETROIT—E. R. Moats of E. W. Heintz Co., Akron, Ohio, and E. H. Wilson of Southwestern Gas & Electric Co., Shreveport, La., qualified as winners in Kelvinator's "Keep the Ball Rolling" contest, and will be included in the Havana cruise party that will sail from New York Sept. 21 aboard the White Star-Cunard liner *Franconia*. Announcement of the winners was made last week by H. W. Burritt, Kelvinator vice president in charge of sales.

Benton Will Represent Grunow Distributor

BALTIMORE—B. L. Benton has been appointed sales representative in the Eastern Shore and Western Maryland territories for Peoples Electrical Products, Inc., Grunow distributor here.

Mr. Benton formerly was associated with Shapiro Distributors, Inc., former Grunow distributor, and before that with Doubleday-Hill Electric Co.

N.Y. Sun Survey Shows Industry Employment Total Near '29 Peak

(Concluded from Page 1, Column 1) still below their 1929 employment peaks.

Cooler Co., Duluth ice refrigerator manufacturer, showed an employment gain from 50, in 1929, to 1,100 last year.

A list of companies in the field, with their average employment figures for the years 1929 and 1935, is published below. In the tabulation, the employment figures shown for Westinghouse and Du Pont include all divisions of the companies; Fedders Mfg. Co. has discontinued the manufacture of auto radiator shells since 1929.

Employment Survey

Company	(1) Average No. of Employees, 1929	(2) Average No. of Employees, 1935
Alco Valve Co.	37	69
American Air Filter....	195	100
American Blower Co....	683	566
Amer. Engineering Co....	1,100	600
American Injector Co....	105	61
Apex Elec. Mfg. Co....	1,038	1,449
Bakelite Corp.	625	1,009
Bastian-Blessing Co. ..	350	475
Bohn Alum. & Brass....	4,500	3,000
Bonney Forge Co....	215	150
Borg-Warner Corp.	6,330	10,966
Bridgeport Brass Co....	2,271	2,904
Carrier Eng. Corp....	2,000	1,500
Celotex Corp.	1,408	1,475
Container Corp.	3,200	4,000
Cont. Diamond Fibre....	1,800	1,200
Cooler Co.	50	1,100
Curtis Mfg. Co....	463	570
Dayton Rubber Co....	602	873
Detroit Paper Products..	75	300
Dryden Rubber Co....	953	1,508
Du Pont	36,209	46,000
Ebco Mfg. Co....	180	80
Electromaster	None	318
Fairbanks-Morse	8,000	5,500
Fedders Mfg. Co....	1,126	795
Federal Enameling	600	600
Fir Tex Insulation....	None	145
Formica Insulation Co....	475	630
Frick Co.	1,009	864
Gates Rubber Co....	1,832	1,688
General Electric	87,933	55,706
L. H. Gilmer Co....	356	296
Grand Rapids Brass....	440	432
Grand Rapids Store....	2,228	400
Grand Rapids Varnish..	125	154
Howell Electric Motors	158	182
Ilg Electric Vent. Co....	138	110
Imperial Brass	391	334
Insulite Co.	589	403
Johns-Manville	9,809	8,426
Johnson Motor Co....	675	416
Kason Hardware Co....	41	130
Kelvinator Corp.	3,326	6,622
Leland Electric Co....	420	426
Link-Belt Co.	5,684	4,752
Liquid Carbonic Corp....	2,000	2,200
J. P. Marsh Corp....	179	145
Mathieson Alkali	1,549	1,657
Merchants Refrig. Co....	400	200
Minneapolis-Honeywell	1,125	1,300
Modine Mfg. Co....	660	959
Motors Metal Mfg.	450	350
Mueller Brass Co....	943	979
Mullins Mfg. Co....	1,447	1,304
National Lock Co....	1,500	2,250
National Rad. Corp....	3,325	950
Norge Corp.	300	3,008
(Muskegon plant) ...	300	80
Porcelain Enamel & Mfg. Co. (Baltimore).....	87	80
Puffer-Hubbard Mfg. Co.	150	110
Revere Copper & Brass	6,480	5,799
Russell Electric Co....	100	200
Sangamo Electric Co....	1,000	950
Savage Arms Corp....	1,493	1,057
Schwitzer-Cummins Co..	420	550
Scovill Mfg. Co....	7,393	5,862
Servel, Inc.	2,000	4,500
Sparks-Withington Co..	1,937	1,260
Standard Air Condi....	None	150
Stewart-Warner Corp....	6,835	4,668
B. F. Sturtevant Co....	969	899
Sunbeam Elec. Mfg. Co.	112	884
Trane Co.	166	506
Trumbull Elec. Co....	580	466
Union Steel Co....	374	479
U. S. Gauge Co....	550	750
United Wire & Supply	221	320
Universal Cooler Corp..	489	536
Waukesha Motor Co....	1,238	1,214
Weber Showcase Co....	600	430
Westinghouse Electric..	49,985	34,581
Williams Oil-O-Matic....	376	470
Wolverine Porcelain Co.	125	96
Wolverine Tube Co....	357	559
Worthington Pump Co..	4,373	3,339
York Ice Mach. Corp....	2,839	2,991
Zenith Carburetor Co....	764	426

Kelvinator Extending Plant Facilities

(Concluded from Page 1, Column 5) In announcing the building program, Mr. Mason said:

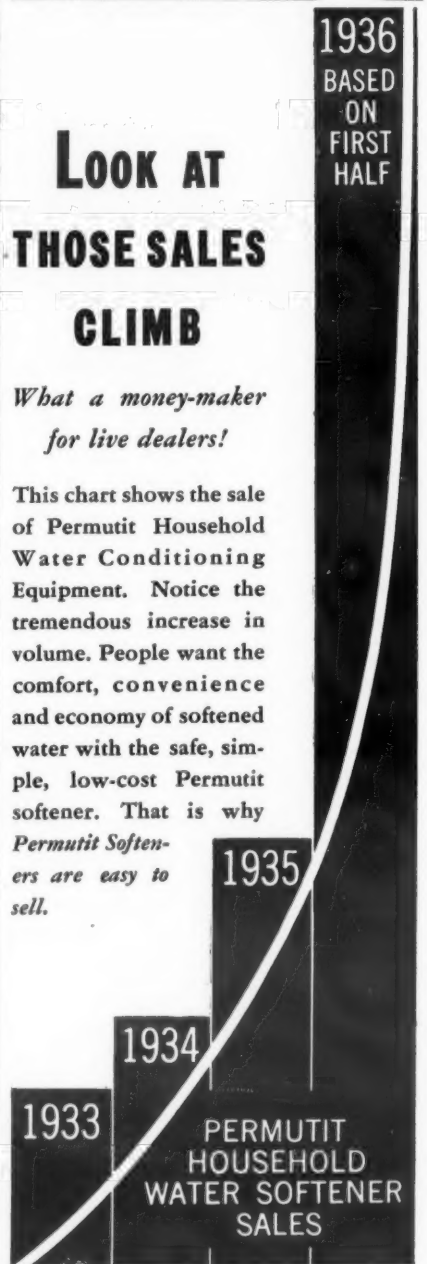
"For some time it has been evident that increasing manufacturing facilities would be necessary in order to maintain efficient production methods and provide as even an employment peak as possible. The capacity of the plant has been taxed by a constantly increasing volume of electric refrigeration units. There has been a decided increase in the demand for air-conditioning equipment, and this demand will continue to increase for several years to come.

"In order to stabilize employment as far as possible, it is necessary at times to warehouse products. Part of the space in the new building will be used for this purpose, releasing space in other buildings for manufacturing processes. Part of the new buildings will be used for production, permitting the use of certain new improved developments in straight line production and assembling methods."

Philadelphia Show Opens Oct. 5

PHILADELPHIA—All principal lines of household electric refrigerators will be exhibited at the Ninth Annual Philadelphia Electric and Radio Show, to be held Oct. 5 to Oct. 10 in Convention Hall here, declares George R. Conover, managing director of the Electrical Association of Philadelphia.

With all exhibit space contracted for, the show promises to be the best ever presented, Mr. Conover says.



Add
Permutit
Household
Water
Softeners
to Your Line

We back you with national advertising, direct mail, local newspaper advertising and a complete sales training course. Write for details and dealer proposition.

THE PERMUTIT COMPANY
Room 723
330 West 42nd St., New York City

"I'm the answer—
TO A NEW DEAL FOR HUSBANDS"

"For men who want a quick, cold drink,
I'm big and strong, right in the Pink,
My rubber grid, I'm glad to say,
Ejected me The Modern Way."

99 out of every 100 husbands insist on the new deal in refrigerators. They demand ice cubes pronto... at the refrigerator... from Flexible Rubber Trays or Grids.

That's the indisputable fact disclosed by a survey among recent refrigerator purchasers. Among other questions we asked women—"What does your husband think of Flexible Rubber Trays or Grids?"

Here are typical answers—"He wouldn't have anything else." "He thinks they are the best part of the refrigerator." "He insisted on having them when we purchased."

Inland full-page advertisements in leading magazines voice the active public demand for this modern method of getting full-sized ice cubes. Be prepared to give husbands the new deal they demand. Appeal to the male vote... and get more sales. Insist that the refrigerator you sell comes factory equipped with a Flexible Rubber Tray or Grid in every ice compartment.

THE INLAND MANUFACTURING COMPANY • DAYTON • OHIO

A TRULY MODERN
REFRIGERATOR SHOULD HAVE A
FLEXIBLE RUBBER
TRAY OR GRID
IN EVERY ICE COMPARTMENT



292,920 Appliances Are Sold by Norge In First Six Months

DETROIT—Breaking all records in the company's history, sales of Norge electric refrigerators during the six months' period ending June 30 of this year surpassed the sales during the same period of last year by 38.5%, reports Howard E. Blood, president of Norge division, Borg-Warner Corp.

Total sales of home appliances for the six months' period reached 292,920 units, an increase of 56% compared to 1935, Mr. Blood said.

Washer sales for the same period went up 128% over the corresponding period of 1935; electric ironers, 437%; gas ranges, 202%; electric ranges, 68%; oil burners, 210%; and commercial refrigeration units 155%.

ELECTRIC REFRIGERATION
NEWS, JULY 22, 1936

Phenomenal? Yes!

BUT PLANNED EVERY STEP OF THE WAY

The rapid growth of Norge is an impressive success story. But this phenomenal growth didn't just happen—it was planned, step by step, as carefully as Norge products are engineered.

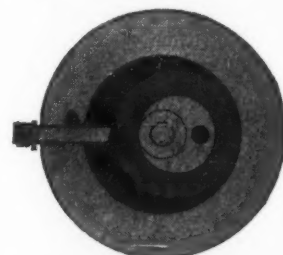
The Norge sales and promotion program is designed, first of all, to make successful distributors and dealers. It accomplishes this by giving them a full line of appliances that set the pace for the industry, plus the greatest amount of well-planned co-operation that the appliance field has ever known. A Norge dealer is in a position to make money—and lots of it—the year 'round.

Get the complete Norge story today. The past is merely an indication of the future—Norge with its better engineered line of home appliances and its better planned sales program will keep on breaking records for sales and keep on making leading merchants of Norge dealers.

NORGE DIVISION Borg-Warner Corporation, Detroit, Michigan.

HERE'S PROOF OF NORGE LEADERSHIP

Norge originated 30 of the most important features in modern refrigeration. **THE ROLLATOR** cold-making mechanism—introduced in 1926. **MODERN STYLING**—introduced in 1932. **COMPLETELY SEALED ICE COMPARTMENT**—introduced in 1926. And 27 other outstanding features. Pace-setting features for next year and the years to come are getting their finishing touches from Norge engineers now.



THE ROLLATOR* COMPRESSOR
... exclusively Norge. Has but 3 slowly moving parts, employs smooth, easy, rolling power instead of the usual hurried back-and-forth action. Result—more cold for the current used and a mechanism that is almost everlasting.

* REG. U. S. PAT. OFF.

ONLY NORGE HAS SO MANY EXCLUSIVE FEATURES IN A COMPLETE LINE OF HOME APPLIANCES

NORGE CONCENTRATOR RANGE with Concentrator Burners—the greatest advance in gas range engineering since the insulated oven. This and other practical features make it easy to sell Norge Gas Ranges.

NORGE ELECTRIC RANGE—Now ready for the first public showing. A completely new line of electric ranges as far ahead of any others now being offered as Rollator Refrigeration is in its field.

NORGE AUTOBUILT WASHER—Every feature of the handsome Norge Washer is better engineered—refined to a more practical degree. You can close sales quickly when you begin enumerating the points of superiority found in Norge Autobuilt Washers. Both gasoline and electric powered models.

NORGE DUOTROL IRONER—Finger-tip control is only one of the refinements that proves to every prospect that it will be easy for her to learn to use the Norge Ironer with skill. Other features are strong salesclinchers, too. The Norge name is a guarantee of quality and faithful performance.



NORGE

ROLLATOR REFRIGERATION (Domestic and Commercial) • GAS AND ELECTRIC RANGES • WASHERS AND IRONERS • WHIRLATOR OIL BURNERS • FINE-AIR FURNACES • AIR CONDITIONING • CIRCULATOR ROOM HEATERS

DEVELOPMENT OF THE AMERICAN HOUSEHOLD ELECTRIC REFRIGERATION INDUSTRY

Progress in Merchandising and Engineering of Domestic Units Traced in Paper For World Congress

By George F. Taubeneck

A CONDENSED version of the following paper on "The Development of the American Household Refrigeration Industry" was presented by Editor George F. Taubeneck at the Seventh International Congress of Refrigeration, held at The Hague, Holland, June 16-21 of this year.

At the conclusion of his remarks before the assembly, Editor Taubeneck mentioned that his original draft of the paper was approximately four times the length of the one which will be published (in several languages) in the Official Proceedings of the Congress. Immediately a number of delegates arose to request that the *complete* article, with additional details, be published in ELECTRIC REFRIGERATION NEWS.

Shortly after the editor's return (early in August) from a seven months' trip around the world in search of information about foreign markets for refrigeration and air conditioning, it was decided that this study of the amazing rise of one of America's great industries would be a fitting lead article for the 10th Anniversary Number of the NEWS.

The reviews of the roles public utilities and department stores have played in the development of the household refrigeration industry (which begin on pages 17 and 11, respectively, of this issue) may be considered amplifying material.

America's electric refrigeration industry has been a development guided and fostered by merchandisers, rather than by engineers.

Its rapid rise to eminence among American industries, its swift spread of the gospel of proper food preservation among American homes and commercial institutions, its attainment of new sales volume records annually throughout the years of recovery, and the almost general acceptance in this country of the idea that ownership of an electric refrigerator is a mark of social prestige, modern living and good business judgement, as well as a practical necessity for the kitchen, have all come about through the keen insight and canny foresight of merchandising men.

The Merchandising Viewpoint

Engineering departments in many other industries work independently to produce innovations which are then turned over to merchandisers to sell. The electric refrigeration industry inverts this process. Its merchandisers find out what the public wants, and what can be sold, and then issue instructions to engineering departments to design refrigerators which will fulfill those desires and needs.

Hence, in order to understand American refrigeration engineering, one must study American refrigeration merchandising.

Gadget Era in Refrigeration

This state of affairs has brought about The Gadget Era in Refrigeration.

The differences between standard makes of refrigerators—as far as the mind of customers is concerned—can be measured most easily in terms of "gadgets," or convenience features of design. Refrigeration systems are different, to be sure; but conflicting sales stories on mechanical points frequently leave the prospect so high in the air that he never does come back down close enough to earth to sign on the line marked with an "X." But Mrs. Prospect makes up her mind in a hurry when she sees how much easier some clever convenience feature can make her daily task.

The importance of gadgets in merchandising may be deplored by the engineers who are justly proud of their triumphs of efficiency in the design and production of refrigeration systems; but true it is that it is much easier to sell a convenience feature than an unseen engineering quality. So, while those manufacturers with reputations to protect must continue to build quality into their refrigerators, they will be adding new gadgets also,

to help their dealers and salesmen in the competitive battle.

Benefactors of American Home

And after all, making the housewife's daily routine easier and simpler is a praiseworthy aim. To be sure, it may be secondary in importance to proper food protection; but the manufacturer who creates and the salesman who delivers convenience are both benefactors of the American home, and as such can justifiably be proud of their respective callings.

Recently three of the foremost advertising agencies in the country became engaged in a highly interesting task; i.e., making an intensive study of the refrigeration industry and its market, with a view toward soliciting the "account" of one of the industry's leading manufacturers—an organization which signified its readiness to do business with one of these three agencies.

A Clean Business

Thoroughly familiar with the methods and practices of sales research, these advertising agencies sent their trained investigators out to interview owners of electric refrigerators, prospective owners, dealers (past, present, and prospective), salesmen, and distributors.

Universally, the investigators for all three agencies reported back one fact which these advertising executives deem highly significant: *electric refrigeration has been an extraordinarily clean business.* Nor is the emphasis on "has been"—the past tense is used merely to indicate caution about making any predictions as to the future.

True, investigators who called on dealers and salesmen have received their share of complaints about chiseling, price-cutting, dumping, trade-ins, free deals, misleading advertising, and questionable competitive tactics. They heard tales about unfortunate dealers being forced out of business, about hard-hearted manufacturers, about unscrupulous competitors. Yet, say these skilled fact-diggers, the average refrigeration dealer and salesman have scant excuse for tears.

"If you think your competition is mean in the refrigeration business, if you are worried by inroads of the mail-order houses in your business, if trade-ins and price-cutting get under your hide," these investigators feel like telling refrigeration men who grumble, "go into the automobile tire business for awhile. Then you'll learn what cutthroat competition really is."

Comparison with Other Industries

These men go on to recite comparisons between the business of selling

refrigerators and other merchandising enterprises, and invariably the contrast is most revealing—and greatly in the favor of refrigeration.

In all their experience in studying specific industries and their distribution problems, some of these research workers have told the editor of ELECTRIC REFRIGERATION NEWS, they have never run across a business which presents so shining an example of fair competition, friendly and harmonious relations between dealers, religious adherence to a high type of sound merchandising practices, and square dealing with the consumer, as the electric refrigeration industry.

Electric Refrigeration as An Industry

Electric refrigeration has attained nation-wide attention and prestige during the past several years as the outstanding example of an industry which could defy the greatest depression in history.

That reputation has been earned, in all probability, largely because the most advanced methods of *specialty selling* have been developed and employed by the executives who have guided the destinies of the industry.

Originally promoted by exceedingly shrewd, imaginative, and far-seeing men, the industry rapidly attracted some of the best sales talent in the country. Under the stress of intense competition, these men applied the art of specialty selling more intensely than it has been since it was originated by John Patterson of the National Cash Register Co.

Sales Statistics

Since 1925 the electric refrigeration industry has had a phenomenal growth. Up to that time not more than 75,000 installations of refrigeration systems had been made in homes in the entire United States.

Another 75,000 systems were installed in 1925 alone. In 1926 installations were more than double, nearly triple, those of the previous year. In 1927 the business nearly doubled again. In 1928 the number of household units sold was in excess of half a million.

During 1930, the first year of the depression, a new high record was made by sales of 850,000 units. In 1931 a total of 965,000 units were sold.

A drop to 840,000 units in 1932 failed to discourage the industry, for in 1933 the total jumped to 1,080,000.

Sales Records Drop Rapidly

In 1934 a new all-time record of 1,390,000 units was established. But even this high mark was to be topped in 1935, when 1,700,000 units were sold. Today it is estimated that 7,250,000 electric refrigeration systems are in use in the United States.

There are approximately 40 active manufacturers of household electric refrigerators in the United States, but less than a dozen of these companies are doing a major share of the business.

The larger manufacturers make all three of the principal components of a refrigeration system—the condensing unit, cooling unit, and cabinet.

Some companies make machines only and buy cabinets; others assemble the entire refrigerator.

Practically all the manufacturers buy parts, supplies, and materials, such as copper tubing, steel sheets, insulation, refrigerants, motors, control devices, hardware, brass fittings, enamels, lacquers, etc. Many of the producers of these supplies have set up special departments to handle the requirements of the refrigeration industry.

Distribution Methods

The complete units of these manufacturers are sold through branch offices, independent distributors, jobbers, and dealers. Many of the distributing organizations maintain retail stores under their own control.

A large share of the total sales is made by a relatively small number of distributors and dealers. Best results, in terms of volume, have been secured through closely-controlled distributor and dealer operations devoted exclusively to electric refrigeration.

Department stores and public utilities also have sold electric refrigerators in great volume.

The larger manufacturers have encouraged extensive distribution for display purposes and to secure every possible contact with the public; but several thousand of these dealers sell only a few units per year each.

Distribution Setup

Operations of distributors and dealers are closely controlled and directed by home offices. Headquar-

ters staffs may include a number of specialists who head up divisions such as dealer, distributor, public utility, household, commercial, air conditioning, apartment house, water cooler, beer cooler, ice cream cabinet, rural, sales planning, sales schools, service, home economics, new developments, and the like. Advertising and sales promotion departments are large and well organized.

Carrying to the field the ideas evolved by these headquarters groups are regional and district representatives, who keep in close contact with distributors and dealers, and study their problems, and help them in many ways.

Early History

How did it all get started? Going back 20 years, we find refrigerating engineers giving a lot of serious thought to the possibilities of household refrigerators for automatic operation, with designs that would permit mass production.

As a rule, experimenters in those days were *individual* engineers (a few had been connected in some way with the large refrigerating machine industry) who were convinced that the same refrigeration cycle employed in big ice and cold storage plants could be made practical to cool a small ice box.

True, if they were in the big machine game their associates scoffed at the idea of producing a "Lilliputian" machine that would perform successfully without the attention of an operator.

'Big Machine' Manufacturers Not Interested

It is interesting to note that few of the big factors in the refrigerating machine industry of these days could see much sense to the idea. These companies were doing a good business in the manufacture of big machines for ice making, and doubtless they were glad to capitalize on the constantly increasing ice business without jeopardizing their position by toying with a development obviously intended to supplant ice.

Nor were the ice box manufacturers any more helpful. Rather, they were definitely antagonistic to the idea. In time, of course, they began to build cabinets for electric refrigerator manufacturers, and eventually, a very few (such as Gibson and Leonard) turned their entire attention to the manufacture of *complete* electric refrigerators. Kelvinator acquired the Leonard plant, and Norge purchased the Alaska factory. Seeger, while never entering into the manufacture of machines, devoted its efforts to supplying cabinets to machine manufacturers.

The Problem of Automatic Operation

As a result, most of the early development work was carried on either by individual experimenters or by companies with no direct relation to the refrigeration field of that time.

Their job was to produce an *automatic* refrigerating system with a couple of hundred pounds of daily ice-melting capacity, using the same basic refrigeration cycle that was used in systems built for many tons of refrigeration per day. This involved a number of problems quite new to the art.

First, automatic controls had to be developed both for the refrigerant and for the electric motor. Ice-making and cold storage plants were always attended by an experienced operating engineer who knew how and when to adjust his valves for more or less refrigerant, and when to start and stop the compressor. Hence *automatic*, instead of manual control, was a new need in the refrigeration industry.

Second, the system had to be completely refrigerant-tight. Ice-making plants leaked refrigerant almost continually, with no other hardship than discomfort to the operator and expense to the owner, but household refrigerators had to be *leak-proof*. There was no question about that.

Reliability, and at least comparative freedom from service, also were prerequisites for the household electric refrigerator. This involved years of development and engineering refinement. Another aim was *low cost of operation*—eventually attained with reduced power rates, improved motors, and more efficient condensing units.

Early engineers went to work designing controls (first of the bi-metallic type, then with gas-filled bellows), automatic expansion valves, compressor shaft seals, valves, etc.

Metallurgists had not yet produced the fine-grained castings known today; as a result the early compressor castings were somewhat porous and inclined to leak. Better production

machinery was needed to machine the compressor parts to the close fits needed for the exacting requirements of a small household system. Compressors got hot—and they were noisy.

One of the big problems was with *moisture* in the system, with resultant corrosion and freezing up of valves. Valves and fittings leaked, completely dehydrated copper tubing was still an ideal to be desired, and thoroughly dried refrigerants were not yet available.

Insulation was not obtainable in packaged, slab form, but had to be cut to fit by the cabinet manufacturer, just as the ice box makers had done for years before.

Suppliers Helpful

In time the various manufacturers of parts and materials realized the potential volume of business available from the new industry, and put their own engineers to designing products especially for electric refrigeration.

Thus firms like Commonwealth Brass, Mueller, and Kerotest evolved leak-proof valves and fittings; Ranco and Tagliabue came out with electrical controls for household refrigerators; Penn and Minneapolis-Honeywell devised commercial refrigerator controls; Fedders brought out household evaporators and refrigeration accessories; Dry-Zero, Wood Conversion, Insulite, Celotex, and finally the cork companies introduced packaged slabs of insulation suitable for mass production; Wolverine Tube, American Brass, and French developed equipment for making dehydrated copper tubing; Ansul and Virginia Smelting developed methods of producing and shipping sulphur dioxide to the refrigeration manufacturer in a dry state; Roessler & Hasslacher (working with Copeland and Servel) refined the material methyl chloride for use in refrigeration; Detroit Lubricator, Alco, and Fedders developed expansion valves that are now practically fool-proof; and with the adoption of air-cooled condensers in 1924 and 1925, Bush, Fedders, and McCord furnished low-priced, non-leaking fin coil condensers.

Motor manufacturers such as Century, Wagner, Delco, General Electric, Leland, Howell, Westinghouse, etc. also helped the refrigeration engineer with more reliable, quieter, repulsion-induction and capacitor motors with high starting torques, especially designed for refrigeration service.

Development of V-belt drives by the belt manufacturers was an important aid in reducing noise, as have been automatic belt tighteners and the design of spring and rubber mountings for the condensing unit.

Sealed Machines

Probably the most radical innovation in household refrigeration came with General Electric's official introduction in January, 1927, of a household refrigerating machine *hermetically sealed* in a steel case, while coiled around the compressor was a condenser cooled by *natural air circulation*. Prime advantage of this system is the elimination of the compressor shaft seal, as motor and compressor are both built inside the casing.

A number of manufacturers have followed G-E's suit in this respect, notably Westinghouse, Gibson, and Frigidaire, the latter with the sealed rotary compressor in its low-priced line. In these, the motor, compressor, condenser, evaporator, etc., are built as a "unit" for installation as such in the cabinet.

It cannot be said, however, that the trend is either toward or away from hermetic machines. In general both hermetic and conventional types of machines are now highly satisfactory, the chief point of difference from the user's standpoint being the distinctly different methods of servicing.

Start of Long Service Plans

Coincident with General Electric's introduction of the hermetic system came a service policy that was as radically different as the new hermetic system itself, namely *factory servicing*. When a system becomes inoperative, it is taken out of the cabinet (compressor, evaporator, controls as a unit) and replaced by a new one. The defective unit is shipped back to the factory and repaired there, instead of in the field.

Makers of conventional machines don't have to have compressor units shipped back to the factory for service, but maintain trained service departments at their branches or distributorships where the work is done. Some manufacturers employ independent service companies in

(Continued on Page 6, Column 1)



Saturation?

So many electric refrigerators have been sold in the past ten years that many people wonder how long the industry can last. Is the point of market saturation just ahead? How much more refrigeration will the market absorb? And are there any new frontiers awaiting active sales development? In estimating the future of the industry, consider these FIVE great markets—

1. Household

Of the more than twenty million wired homes in America, only one in three is today equipped with electric refrigeration. This leaves a vast untouched market yet to be developed. With improved conditions and increased buying power, this market is highly responsive, as is indicated by unprecedented sales in 1936. The building of new homes and extension of electric lines through rural districts are important factors contributing to the continued expansion of this market for household units.

2. Commercial

Commercial refrigeration of all kinds—for hotels and restaurants, grocery stores and meat markets, floral shops, night clubs, soda fountains, etc.—is enjoying a boom year. During the depression this business dropped below normal—now it is reaching new peaks in sales. Potential business in this market, including new installations and replacement of obsolete equipment, looks very encouraging for the next several years. New applications are constantly expanding the market for commercial refrigeration.

3. Air Conditioning

Your own imagination will enable you to visualize the opportunities offered in air conditioning—the newest, most spectacular market for refrigeration. Although still in its infancy, many millions of dollars have already been invested by the public in equipment for air-conditioning homes, offices, restaurants, hotels, theaters, stores, and for industrial purposes. The future of this market is largely a matter of aggressive sales promotion through properly selected channels of distribution.

4. Replacement

There is a rapidly growing market in the refrigeration industry offered by replacement and service. More than eight million household electric refrigerators are now in use—more than a million and a half commercial installations. Household refrigerators and commercial equipment eventually arrive at the age for replacement. In this respect the refrigeration industry may be likened to the automotive industry. The period of replacement has already arrived and presents a large permanent market.

5. Export

Export markets are just beginning to open up with vast potential sales possibilities. As reported by Editor George Taubeneck, who recently completed a seven-months' trip around the world, foreign countries have been far behind the times as regards food preservation

and healthful conveniences offered by electric refrigeration. They are now becoming refrigeration conscious. American manufacturers have a great opportunity to develop a highly profitable export business in all types of refrigeration equipment.

During the development of the industry in the past ten years, the important manufacturers have found advertising in the News to be consistently effective in their promotion plans. Looking to the future and the coming development of these FIVE great markets, plan now to use the News in obtaining your share of this expanding business.

ELECTRIC
REFRIGERATION NEWS
5229 CASS AVE. DETROIT, MICH.

ENGINEERING PROGRESS IN HOUSEHOLD ELECTRIC REFRIGERATION

New Products Perfected for Use In Mechanical Refrigerators

(Continued from Page 4, Column 5)
territories where they have no factory agent.

Rotary Compressors

The success of Norge with its rotary compressor has renewed discussion in all quarters of the rotary versus the reciprocating compressor. Proponents of the rotary claim less vibration, high efficiency, and less servicing.

Frigidaire, G-E, Crosley, Grunow, and others have also brought out rotaries.

Frigidaire's rotary, introduced in the spring of 1933, is of interest because it employs a new refrigerant F-114 (of the same family of halogen hydro-carbon derivatives as Freon), and because it has a large flat steel condenser, spaced from the back of the cabinet, to provide a flue for natural circulation of air for cooling. The machine has a very small split-phase motor (1/16 or 1/20 hp., depending on the cabinet size) directly connected to the rotary compressor inside a sealed steel case. Operation under warm room conditions is practically continuous, while under lighter loads the unit cycles according to commands of a thermostat. This system was developed by A. A. Kucher.

Monitor Top Improved

In the spring of 1933 General Electric came out with a Monitor Top that was vastly improved in appearance, chiefly because the circular, tubular condenser of previous models was replaced by a cylindrical steel condenser on which dust won't collect.

Again in the spring of 1934 General Electric added to the appearance of its Monitor Top by placing the float valve behind the Monitor Top and by further enclosing the condenser. Chief criticism of this machine has always been its odd appearance, and these refinements have come as a result.

Grunow's development was a refrigerator charged with Carrene, a low-pressure gas which had been developed some years before for Carrier's centrifugal compressors used in air conditioning. Carrene operates below atmospheric pressure on both high and low sides. Compressor used in the Grunow system is a four-vane rotary of the open type.

Other Rotary Developments

Quite a few new compressors of various types and descriptions have been developed during the past few years, showing that engineers are fully aware of the importance of an efficient, quiet, and trouble-free compressor mechanism.

One of the most interesting of the new designs is a sealed compressor which employs the action of an external rotating magnetic field to propel the rotor. This was brought over to America by Carlos Zorzi, an Italian engineer and inventor of one of the first vacuum feed systems (now being built by Stewart-Warner) and several electro-chemical processes.

Two-Temperature Refrigerators

Kelvinator DeLuxe and Potter refrigerators have two separate compartments, one for normal temperatures (40 to 50° F.), the other for zero temperatures suitable for prolonged storage of frozen foods and desserts, and for quick-chilling of foods.

The refrigerant is first expanded into a plate coil in the low-temperature chamber which freezes ice cubes and holds the zero temperature.

Further expansion of the refrigerant takes place in an extended fin coil in the larger normal temperature compartment. Here quite a high relative humidity can be maintained because the second coil operates at a higher refrigerant temperature than standard refrigerators which must freeze ice cubes. Thus dehydration of foods is eliminated. The Kelvinator is also equipped with an interior fan for forced air circulation.

Refrigerant Metering Devices

Refrigerant metering devices are about as numerous as the different kinds of systems now in use. Most popular in household refrigeration are automatic expansion valves, low side floats, and high side floats. High side floats are particularly popular with manufacturers of sealed compressors.

High Side Floats

The high side float lends itself to the sealed packaged type system

which is installed as a unit in the top of the cabinet, because it can be small in size, and because its manufacturing cost for use with this system is low.

It must be specifically designed and built to serve the needs of the system which it serves, however, as the refrigerant charge used with a high side float is quite critical.

High side floats are employed also to control the flow of refrigerant in conventional systems. In this case the float is generally built large enough to hold the entire charge of refrigerant and is mounted below on the condensing unit, with a pressure-reducing valve above just before the evaporator to prevent frosting of the liquid line.

Use of Low Side Floats

Low side floats, used for years in all kinds of electric refrigeration installations with the "flooded" systems (ice cream cabinets, commercial, etc.), are still widely used in household refrigerators. These consist of a bucket or float ball inside a fairly large header on the evaporator.

Advantages of the low side float are a high rate of heat transfer through the evaporator, due to its interior wetted surfaces, its charge of refrigerant is not critical because a surplus of refrigerant is carried in the liquid receiver, it can be used with multiple systems, and there are no adjustments for the refrigerator owner to tamper with.

Expansion Valves

Expansion valves, both automatic and thermostatic types, have been highly refined during the past few years, the first for house-refrigeration, the second for commercial applications.

The automatic valve (main adjunct of the so-called "dry" evaporator) is made in several different designs, but each is built to maintain a constant pressure in the evaporator by means of some type of bellows arrangement which is actuated by the pressure in the evaporator to control the flow of refrigerant. Two or three makes are very popular in household refrigeration, and are standard with a goodly number of refrigerator manufacturers. They are serviceable, replaceable, dependable, and capable of rather fine adjustment.

Correction of Troubles

Cause of most trouble in expansion valves has been corrosion of the needle and seat due to the high velocity of the gas moving through the small orifice. This is another problem which is being solved by engineers not directly connected with, but rather allied to, the refrigeration industry. Stainless steel and Stellite are two of the materials which have been applied to valve seats and needles.

A refrigerant-metering device introduced some years ago on the now obsolete Rice machine, and more recently used by Servel, Crosley, and one or two others, is the capillary tube. This is simply a length of small-bore tubing, with a hole three or four hundredths of an inch in diameter which connects the high and low sides of a household refrigerating system.

Modified Capillary Tube

A modification of the capillary tube is used by Frigidaire on its "standard" models. This device has a small orifice formed by machining off the outer edge of male threads of screw arrangement.

Familiar item to every commercial refrigeration installer is the thermostatic expansion valve which has rapidly grown in importance, especially with the development of finned coils for commercial refrigeration. The thermostatic valve includes the same mechanism used in automatic valves, to which has been added a thermostatic power used in automatic thermostatic power element consisting of a second bellows which is operated by a refrigerant-charged bulb on the end of a connection of small-bore tubing.

Operation of the thermostatic valve is a high complicated subject. One of the most easily understandable expansions is that "the thermostatic expansion valve keeps the evaporator completely refrigerated at all times."

Thermostatic expansion valves are considerably more efficient than automatic valves, and hence are used exclusively on many beer coolers, milk coolers, and other commercial applications.

Newest advance in expansion valves is the development by Detroit Lubricator Co. of non-adjustable valves in both automatic and thermostatic types.

Valves are set at the factory for the pressure required for any particular application, and sealed so that subsequent tampering is impossible.

Fittings

Noteworthy progress has also been made in the development of improved fittings, valves, and tubing for electric refrigeration installations. Mueller Brass Co., for instance brought out "streamline" fittings late in 1930 which abandoned the screw connection in favor of a soldered joint in which a special solder is drawn between two brass or copper pieces by capillary attraction to form a tight, leakproof connection.

A few months later, Kerotest Mfg. Co. introduced a packless diaphragm valve with flexible disks of stainless steel to seal the valve stem. This is a back-seating valve, as are a good many others now used in refrigeration.

An innovation in copper tubing came in 1933 when the French Mfg. Co. adopted a new process of manufacturing refrigeration tubing which produced single lengths up to four or five hundred feet.

Silver solder is another product which the industry has found useful, particularly in manufacture of evaporators and wherever high strength is desired. Most silver solders are in effect brazing alloys to which a small amount of silver has been added. They are applied with a blow torch.

Evaporators

Progress in evaporator design has been steady although not spectacular, ever since the inception of electric refrigeration. Early troubles were gas binding, accumulations of oil, etc. and early models did not provide the efficient removal of heat that today's models attain.

One of the most important developments in evaporators is the dry system, so called because the refrigerant enters the cooling unit through an expansion valve and promptly evaporates without accumulating to produce a flooded or even wet condition in the coils.

Early Types of Evaporators

In the early days nearly all parts of the evaporator were made of non-ferrous metals (copper and brass). Perfection of methods to keep moisture out of the system probably explain why steel is now widely used in dry expansion evaporators. Another factor contributing to the use of steel was the development of welding processes which left no scale inside the evaporators.

The refrigeration industry is still a large market for copper and brass, however, not only for the many evaporators and condensers which are made of these metals, but for tubing, fittings, liquid receivers, valves, hardware, etc.

With the advent of extensive use of steel in evaporators came new methods of construction, cheaper and more suited to mass production. These are based on stamping out a shell on large presses, and the use of automatic machines to fasten together two steel pieces which form a shell type evaporator.

Adoption of Porcelain Finish

Popular method of finishing the new steel evaporators is with a couple of coats of porcelain, giving an attractive, cleanable surface. Stainless steel evaporators also have come into prominence, and have these same sanitary features. Evaporator doors are becoming more and more popular, even on some of the low-priced models of household refrigerators, to keep food odors out of the ice cubes and to improve the interior of the refrigerator cabinet.

A number of refrigerators now have "refrigerated shelves" in the evaporator. These have channels for passage of the refrigerant, and produce fast freezing of ice cubes.

Brine tanks, once common on almost every model in a line of household refrigerators, are now relatively rare. Their function of reducing the frequency of operating periods for the compressor, it would appear, has been met by other means, and their advantage of providing a "hold-over" of refrigeration has been given up in deference to savings in manufacturing cost made possible by their omission.

New Defrosting Controls

The problem of defrosting, which was a nuisance to the housewife, has been solved by makers of electrical controls who introduced the wide cycle, semi-automatic system of defrosting during 1933.

This new type of control is very similar to the "Cold Control" with its dial for manual selection of several temperatures, but has in addition a defrosting position. When turned

to the defrost position, an auxiliary spring is placed in position to impose an additional resistance to the bellows movement, raising the temperature at which the switch contacts close to start the compressor.

Set at the defrost position, a control stops the compressor at the normal cut-out temperature but doesn't start the compressor until the evaporator temperature has risen well above 32° F., thus permitting the frost to melt off until the elevated cut-in point is reached and the system resumes refrigeration.

Operation of Wide Cycle

This wide cycle operation continues until the housewife returns the control to normal operation. Should she forget and leave the refrigerator at defrost, the temperature in the cabinet will not rise high enough to damage the foods.

A still closer approach to the ideal of complete automatic defrosting is the control adopted by several manufacturers, which has a defrost position to which the housewife must place the control, but in addition has an automatic spring return which places the refrigerator back at normal operation when defrosting is completed.

This same control has a "quick-freeze" position at which the refrigerator will hold its coldest temperature for making frozen desserts, and an automatic spring return to resume normal operation when the freezing is finished.

Mechanical Defrosting

Inventors have been quite active working on automatic defrosting devices, one of the most interesting being a mechanical arrangement which shuts down the unit when the frost builds up to a certain thickness, and starting it when the frost has melted off.

One that appears to have considerable possibilities (and is now on the market) utilizes a synchronous clock movement to shut down the unit for a short time once every 24 hours. Merchandisers of this outfit recommend that it be set to defrost at night.

Ice Cube Trays

Recent advances in ice cube grids and trays are making it much easier to extract the ice cubes. First successful aid to easy removal of ice cubes was the flexible rubber tray, invented several years ago by Lloyd Copeman, a refrigerating engineer, and subsequently purchased and extensively merchandised by the Inland Mfg. Co. This company has also brought out a rubber grid which can be placed in the standard metal ice tray, thus securing the more rapid freezing of a metal tray, but providing at the same time for easy removal of frozen cubes.

McCord Radiator Co. has a stainless steel ice tray, one cube in width, from which frozen cubes are ejected without the aid of hot water, by flexing the tray along its length.

Refrigerator manufacturers have also made a helpful contribution in this direction during the past year by providing cam-action handles or levers which pry the metal trays loose from the evaporator.

Thus ice cubes are not so hard to get at as they used to be, and if present advances continue they may come popping out of the refrigerator automatically!

A few years ago ice cube trays were made of copper, tinned, but nowadays they are mostly aluminum. Newest development in aluminum trays is the anodic treatment which prevents discoloration.

New Insulations

The industry has seen many changes in methods and materials for insulating its refrigerators. Cork was the first insulation used in large quantities, and is still standard for large commercial boxes of the walk-in type. Likewise, it is still the "standard of comparison" in heat transfer values for the many other insulations now used in household refrigeration, although it is used scarcely at all in the household field.

A common insulation for household refrigeration during the past few years have been the formed packages made by Dry-Zero, and the board fibre type such as Celotex and Insulite.

Paper and Aluminum Foil

Two new insulations have gained a foothold in the refrigeration field during the past two years. First is corrugated paper, which the paper box manufacturers can make up in packaged, slab form at a very low cost. This paper insulation depends for its heat-resisting effect on its many minutely small dead air cells.

Second is aluminum foil which Frigidaire began to use in household refrigerators, and which was already being installed in crumpled form in

refrigerated motor trucks. Frigidaire has a different method, suspending several sheets of the foil parallel to each other, stretched tight by a supporting framework.

The story of the insulating action of aluminum foil is an interesting one. Bright surfaces of the foil are supposed to reflect radiant heat, while the dead air spaces between the foil are claimed to eliminate heat transfer by conduction and convection.

Newest development in aluminum foil is the marketing of formed slabs of the insulation all sized and shaped for installation in refrigeration cabinets. This is now being done by the Reynolds Metal Co.

Slab Forming Machines

To meet price competition in the insulation field, Wood Conversion Co. (manufacturer of wood fibre slab insulation) has developed a novel system which is finding some favor among refrigerator manufacturers.

Instead of making the slabs at its own factory, this company ships bales of the insulating fibre, packed in very dense condition direct to the refrigerator manufacturer, where special equipment (furnished by Wood Conversion) fluffs out the material and forms slabs of the correct size.

Advantages of this system are substantial savings in freight rates made possible by shipping the material in condensed form, and the reduction of stock on the refrigerator manufacturer's premises since he can fabricate any size of slab needed for his current requirements.

Improved Cabinet Finishes

Cabinet finishes have undergone marked improvement during the past few years, particularly the lacquers. The two principal finishes for household electric refrigerator cabinets are porcelain and lacquer, the first being applied on most deluxe models, the second on lower-priced cabinets. Proportion of lacquer to porcelain models is something between 2 and 3 to 1.

Chief reason for this preponderance of lacquer cabinet sales is the fact that porcelain-finished refrigerators of exactly the same capacity and with the same compressor mechanism range from \$20 to \$30 more in retail price. A few have a price differential of only \$10, but some of the large-sized cabinets cost as much as \$40 more in porcelain.

Pace Set by Porcelain

Favored with very white, lustrous finish, a long life (as evidenced by the one-time three-year guarantees on those cabinets finished only in porcelain), and being impervious to almost every kind of abuse except chipping, porcelain has set the pace for lacquer manufacturers to work toward in development of improved finishes.

Judging from recent developments in lacquers, it would seem that they are making real headway. Some of the lacquer finishes now available are resistant to humidity, salt air, grease, sulphur dioxide fumes, as high as a 50% solution of alcohol, and are elastic and adhesive enough to prevent chipping. They are baked on at higher temperatures than previously, and have increased durability.

Advantages of Lacquer

Lacquer has an inherent advantage, of course, in workability and patchability (panels don't have to be junked if they are marred along the production line), and a wide range of color possibilities.

Common enemies of a refrigerator finish are moisture, grease, acids, refrigerant fumes, salt air, all of which tend to cause discoloration and general deterioration. Durability is another important consideration, especially on the refrigerator door where the finish is subject to continual rubbing.

An important new development of the past two years in refrigerator finishes is du Pont's new synthetic resin finish, Dulux. This is a hard finish, with a lustrous white appearance that very closely approaches that of porcelain.

It is applied with elevated temperatures as high as 425° F. for the primer coat and first coat of Dulux, followed by the finishing coat at about 260° F. In spite of the fact that these temperatures generally require new ovens, several cabinet manufacturers have now installed the necessary equipment for Dulux.

Colored Cabinets

There is an occasional flurry of interest in colored cabinets and some rather unusual effects have been produced with color although none of these have met with any great degree of public acceptance.

One of the most interesting excursions into the realm of color was the trial of pearl essence finish.

This finish has iridescent qualities, since its cast or color seems to change

(Continued on Page 8, Column 1)

Background

● True to Fairbanks-Morse tradition, the CONSERVADOR Refrigerator brings to electrical refrigeration greater efficiency, greater economy, and greater convenience, plus a heritage of confidence built and sustained through 106 years of precision manufacture and unwavering fidelity to distributor, dealer, and consumer.

Back in 1830—three years before Chicago became a village—before the rails of the first American railroad were laid—while Andrew Jackson was president of the United States, Thaddeus Fairbanks invented the system of weights and levers which even to this day is the basis of every modern scale. Weights in the Bureaus of Standards of most of the nations of the civilized world are made by Fairbanks-Morse.

Fairbanks-Morse manufactured the first direct current generating machinery for the incandescent lamp invented by Thomas Edison.

Fairbanks-Morse was the first commercial manufacturer of gasoline engines in the United States.

Fairbanks-Morse is the world's largest manufacturer of Diesel engines.

Fairbanks-Morse motors furnish power for every type of industry.

Millions of homes are served with electricity generated by Fairbanks-Morse equipment.

Fifty thousand homes off the high lines generate their own electric current with Fairbanks-Morse machinery.

Fairbanks-Morse pumps furnish water to millions of city dwellers—and 125,000 homes beyond city water mains have Fairbanks-Morse home water systems.

Fairbanks-Morse is one of the six oldest continuous national advertisers in the United States.

Little wonder that the name Fairbanks-Morse has become a synonym of dependability in every walk of life—farm, factory, shop, mill, mine, and home.

Little wonder, therefore, that an electric refrigerator bearing the name Fairbanks-Morse was entrenched in public confidence from the very start.

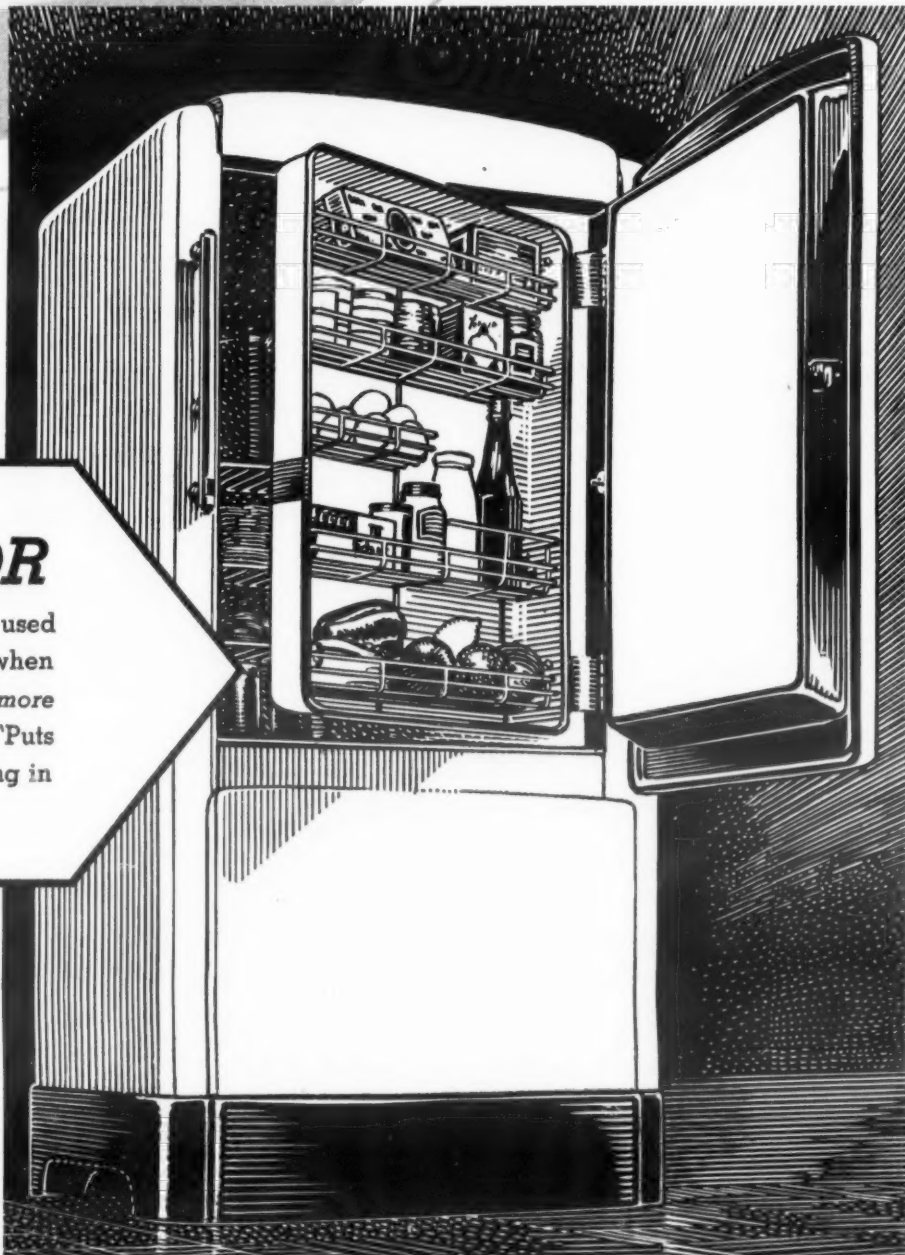
Little wonder, too, that the CONSERVADOR Refrigerator has vaulted to a position of leadership in so short a time. More visible, extra value features that dealers can demonstrate and buyers can understand.

This is the CONSERVADOR

—an inner door behind the main door, for storing most frequently used foods. Keeps cold air from rushing out—warm air from rushing in when main door is opened. Gives the CONSERVADOR Refrigerator *more* usable storage space than any other refrigerator of the same size. "Puts the back shelf up front." Saves time. Saves steps. Makes everything in the refrigerator easy to take out, easy to put back in place.

Fairbanks-Morse CONSERVADOR offers your customers everything worthwhile offered by any other refrigerator—*plus* the CONSERVADOR—which *only* Fairbanks-Morse can offer.

The franchise in your territory may be open. If so, it's the big profit opportunity in the field. Write Fairbanks, Morse & Co., Home Appliance Division, Indianapolis, Ind.



FAIRBANKS-MORSE
Conservador  **REFRIGERATOR**

Merchandising Developed Need For Changes in Construction And Design of Cabinets

(Continued from Page 6, Column 5) with light reflection when viewed from different angles. It also differs from conventional lacquers in that it registers a depth perception, and resembles the gloss and lustre of pearl.

There appear to be two definite, limited fields for the colored cabinet at the present time. First is for special kitchens with individual style and color combinations, the second is for display models of refrigerators intended to catch the public eye in passing a store window. It is not unlikely, however, that recent trends in styling of refrigerator cabinets will open up new opportunities for a dexterous use of color.

Convenience Features

Manufacturers have become "feature-conscious" during the past three years (stimulated perhaps by Crosley's Shelvador), with the result that 1936 models are replete with convenience features and "gadgets" intended to make them more appealing to the prospective buyer.

No longer can it be said of electric refrigerators that "they are all just about alike." This year they are being distinctively styled, and many are provided with features designed to make them different.

For example, Kelvinator's "Food Filing" system provides three separate refrigerated metal drawers in the bottom of the food compartment. Dairy foods, vegetables, and left-overs can thus be preserved in a convenient manner, keeping the storage space above free for larger products.

Foot Pedal Door Openers

Another convenience feature is the foot-pedal-operated door opener, pioneered by Leonard as the "Len-A-Dor" and promptly adopted by Gibson, General Electric and others. With this device a housewife can walk over to her refrigerator with both hands full of dishes, and open the door by tripping the pedal with her foot.

Crosley Radio Corp., which brought out the "Shelvador" (shelf within a door) in 1933, has added several similar features to the new Crosleys. These include the "Shelvatray," a demountable wire shelf which hinges down from the inner side of the door (which extends for the full height of the refrigerator), and the "Shelva-basket," a wire vegetable basket on the lower part of the door, arranged to swing into a "Storabin" non-refrigerated storage compartment below. The latter is for potatoes and other produce which doesn't require refrigerated temperatures.

Rolling Shelves

Stewart-Warner introduced a new feature with its rolling shelves. These are wire shelves whose edges rest between rollers so a shelf can be pulled forward easily to a stop position. By flipping a small clasp upward, the user can then remove the shelf from the refrigerator and use it as a tray (edges are provided all around the shelves to avoid dropping dishes when used as a tray). Also introduced by Stewart-Warner is the Sav-a-Step—a removable shelf arrangement which holds just the foods one needs for breakfast.

Sliding shelves, it will be remembered, gained popular acceptance several years ago, following aggressive advertising of that feature by General Electric. They are now standard equipment on many makes of refrigerators.

One new Leonard feature is a service or rearrangement tray which slides out from below the bottom shelf of the refrigerator. It is intended to be drawn out and used in rearranging food contents of the refrigerator—saving food juggling. The tray can also be used in loading the refrigerator for serving, as it is removable. It is fabricated of anodically treated aluminum.

Shelves are generally being made more flexible in new models to give the housewife more choice in arrangement of the interior of her refrigerator. Some are folding, others have removable sections to accommodate unusually high dishes or bottles, others are telescopic. Most refrigerators have at least one adjustable shelf this year.

Electric lights which switch on automatically when the cabinet door is opened are standard on practically all deluxe models. Their placement has been changed somewhat by some manufacturers to avoid shutting off the light with large dishes on the top shelf. Also standard size receptacles are being adopted so a burned-out lamp can be replaced without

shopping around for a miniature lamp.

Semi-Concealed Hardware

In hardware, the trend has been quite definitely toward use of the semi-concealed type, particularly on deluxe models, and many refrigerator manufacturers have taken pains to secure hinges and door latches designed specifically to harmonize with their particular cabinet styles.

Several manufacturers have adopted door latches with the easy-open feature. Norge's latch has a raised section which swings open the food chamber door when pressed with a fingertip or elbow. Stewart-Warner has a similar device on its latch. And Westinghouse has a vertical bar at the side of the door which may be touched with the knee or pulled with a finger to swing wide the door.

In a number of instances, manufacturers this year have enlarged their ice trays or have added extra ones, thus enabling them to highspot the "ample ice" feature of their product to a public whose ice consumption has increased since prohibition repeal.

Extra Storage Compartments

Extra storage compartments below the food storage chamber are featured by some manufacturers this year. Crosley has a Storabin at the bottom of its deluxe cabinets, and Potter has a similar compartment. Jewett has a drawer for perishables, and in the new Mayflower refrigerator is a pull-out panel inside of which is space for upright storage of bottled goods. The 1936 Leonards have a drawer for vegetable storage in the bottom of the cabinet.

Practically every deluxe model has a basket or two for dairy products, eggs, citrus fruits, and the like. Most of these are fastened close against the food chamber wall, or are hung from a shelf to increase actual storage capacity.

Centrally located evaporators are a feature of a good many models on the market this season. Reason is that such a location for the evaporator gives added bottle-storage space, and increases the amount of space which the manufacturer may list as usable storage capacity under the Nema rating.

Use of Evaporator Doors

On both deluxe and standard lines, evaporator doors are being quite generally used. These prevent ice cubes from acquiring odors from food, and add to the cooling unit's appearance.

Stewart-Warner is using an evaporator door, hinges of which may be clipped on either side of the evaporator to give the door either a right or left swing, depending upon the housewife's preference.

Westinghouse furnishes a vacation or economy position on their control, at which the refrigerator can be left running with lower power consumption, producing just enough refrigeration to preserve foods when the family is away for a few days.

Considerable attention is being given to maintenance of higher relative humidities in the cabinet.

Styled Refrigerators

Style began to come into its own in the refrigeration industry in 1933, although it was given serious consideration and attention by manufacturers of electric refrigerators in the fall of 1932. At that time the biggest problem was what to do about "fly-by-night" competition.

The "fly-by-nights" had electric refrigerators which looked just like those put out by standard manufacturers, but their prices were much, much lower. It was tough competition, especially in department stores, where these "fly-by-nights" were lined up beside established makes.

By giving their cabinets distinctive style, however, it was thought that the leading manufacturers might make their refrigerators stand out in a line of many makes, and might give extra punch to the pride-of-possession appeal.

Styled cabinets, it was suggested, should lend themselves especially well to department store merchandising. Then, too, it was reasoned, women can be sold much more easily on appearance than on mechanical superiority.

Major manufacturers began to follow some such line of thought when they worked up their 1933 models. Several individually styled models made their appearance in the new lines, and the industry became definitely style-conscious.

Streamlining has been the major motif running through the more modern cabinet designs.

Cabinet Construction

A few years ago there was a decided swing to steel in cabinet construction, one or two manufacturers featured "all-steel" refrigerators. This development now appears to have reached equilibrium.

Food compartment liners drawn for a single piece of sheet metal are also being mentioned among features. The usual practice is to apply two or three coats of acid-resisting porcelain to the interior of the food compartment. Interior corners are generally rounded to facilitate cleaning out the refrigerator.

"Balloon-type" rubber gaskets for cabinet door seals provided a further refinement of cabinet construction. Doors were hung more rigidly, with hinges that swing at the slightest touch so that the housewife could close her refrigerator with the same ease as she opened it by the new types of latches.

The trend has been to shorter and more massive legs to attain "streamline" effect, reversing the trend toward "broom-high" legs which seemed to be coming into vogue a few years ago.

New Refrigerants

New refrigerants have always been an absorbing topic of discussion among refrigerating engineers. The advent of Freon in 1931 created the greatest stir in the engineering profession because it was brought out as a non-toxic refrigerant and subsequent investigations revealed the fact that it decomposed in the presence of a flame into certain highly toxic compounds. Proper name of the refrigerant is dichlorodifluoromethane. Boiling point is 21.6° F., its chemical formula is CCl₂F₂.

Opponents of the new refrigerant pointed out that a household refrigerator using Freon might leak gas which would decompose into small quantities of toxic compounds if a gas range were installed alongside the refrigerator.

Freon Used in Some Models

Frigidaire (co-developer of the new refrigerant with du Pont engineers) used it in some of their household refrigerators during 1931, but abandoned it for that purpose, temporarily at least, partly because it seemed difficult to hold in a household compressor and partly because of the opposition to the refrigerant which was stimulated by the rumors of decomposition.

Throughout 1932 and following years, however, Freon made definite progress in the commercial refrigeration and air-conditioning fields. Frigidaire has employed Freon since the start of its air-conditioning equipment, as have Westinghouse, General Electric, and others. Also, it has been adopted for air-conditioning units by companies like York, Carrier, Frick, and Baker, which were in the air-conditioning business before Freon was available.

Reports of Laboratories

With the exception of a relatively few antagonists to the refrigerant Freon, it is now fairly well agreed that its decomposition hazards were over-emphasized when they were first discovered.

The U. S. Bureau of Mines report R. I. 3013 states that animals live for an indefinite period of time in an atmosphere of 20% of Freon gas. Higher concentrations cause physiological disturbances, but the report indicates that these may be primarily due to the deficiency of oxygen.

The Underwriters Laboratories' last report on common refrigerants (No. 2375, issued in November, 1933) furnishes results of extensive tests conducted to determine the comparative life, fire, and explosion hazards, including a complete investigation of decomposition in the presence of flames.

Some city code authorities are permitting the installation of room-cooling and air-conditioning equipment using direct expansion of Freon, usually with limitations on the amount of refrigerant in a single system, but they have resisted attempts to have Freon relieved from such requirements as the enclosure of refrigerant lines in conduit (a specification of the A. S. A. standard code of mechanical refrigeration).

Other code authorities are banning direct expansion of refrigerant in an air stream where crowds of people collect, and require the use of some heat transfer medium such as brine or water in the indirect system. Most of the major manufacturers of electric refrigeration equipment are now using Freon in some of their machines.

Low-Pressure Refrigerants

Three low-pressure refrigerants have been developed for use in household refrigerators.

First of these was Carrene (CH₂Cl₂ or methylene chloride) which at atmospheric pressure, boils at 104° F., with the result that both high and low

sides of the system operate below atmospheric pressure. This refrigerant is used in all Grunow refrigerators, and was originally developed by Carrier Engineering Corp. for that company's centrifugal compressor used in air conditioning of large buildings.

Next new low-pressure refrigerant to be announced for use in household refrigeration was General Electric's methyl formate, an organic compound formed catalytically by the reaction of methanol and carbon monoxide. It has a boiling point of 89° F. and operates below atmospheric pressure nearly all the time. Patent No. 1,828,559 on this refrigerant was issued to Christian Dantsizen and assigned to General Electric on October 20, 1931.

A new member of that family of halogen derivatives developed by Frigidaire and du Pont for refrigeration was F-114 or dichlorotetrafluoroethane. Chemical formula of this refrigerant is C₂Cl₂F₄ and its boiling point about 38° F. at atmospheric pressure.

Developed specifically for use as a heat transfer medium in General Motors' Faraday, gas-operated absorption refrigerator, monofluorotrichloromethane (F-11) is not being used at the present moment in any standard refrigerator. This refrigerant boils at 75° F., and bears the chemical formula CCl₃F.

Standard Refrigerants

Sulphur dioxide is still the most widely used in household refrigeration, in spite of the inroads made recently by the Freon family, with a number of makes using methyl chloride, and one each using Carrene and Isobutane.

In the commercial field methyl chloride is cited most frequently in the specifications as the standard refrigerant, with sulphur dioxide, Freon, and ammonia also prominent. It is fairly common practice in commercial refrigeration, of course, for a manufacturer to make two or three different refrigerants available for some condensing units so that a distributor can make his own selection to suit the particular requirements of each installation.

'Off-Peak' Refrigerators

A plan to operate household refrigerators only during a power company's off-peak load periods, such as during the night, thus storing up refrigerating effect in an eutectic brine tank provided with the refrigerator's evaporator so that no power will be required during peak periods of power demand, has been proposed by Glenn Muffy, J. G. De Remer, and G. W. Dunham.

The plan is expected to have special appeal to power companies whose lines are overloaded during certain times of the day. They contemplate licensing a number of leading manufacturers to produce off-peak refrigerators under the sponsors' patents, and to sell them through their regular sales outlets with the aid of special cooperation from the local power companies.

Chest Models

Most startling recent innovation in regard to new models was the introduction of the chest-type refrigerator. Built in response to demands of the Government's Tennessee Valley Authority (an experiment in state socialization) for an unusually low-priced refrigerator, these small models had a lid rather than a door, and resembled the old-fashioned top-icer ice box.

Early in June, 1934, General Electric Co. brought out its chest model, to sell for \$74.50 f.o.b. Cleveland, and designated it as the "Liftop." Then Frigidaire Corp. announced its plan to market a lift-lid refrigerator for \$77.50 sometime in August of the same year. It was to be known as the "Kold Chest." Sealed machines were specified, and the model had a capacity of 2 cu. ft.

Others Follow Suit

Next, Kelvinator Corp. introduced its small model, branded the "Electric Kelvin Chest," with a net volume of 2 cu. ft. and selling for \$77.50 plus freight. Nation-wide distribution of this model was decided upon after public interest in small capacity refrigerators in the Tennessee Valley had made it apparent that potential universal demand existed.

A chest model refrigerator featured by the Shelvador principle was Crosley's contribution to the small-model field, with prices \$72.50 east of the Rockies and \$75 west of the Rockies. Distribution was made through the regular channels.

Westinghouse, Norge, and Leonard soon afterward brought out their chest-size refrigerators, at the \$77.50 selling price.

Used as 'Sales Clincher'

Most leaders were in the market in 1934 with the small-size chests, not pushing them, perhaps, because of the small profit, but in the main

using them as sales-clinchers either for prospects who wanted a small second refrigerator, or for those who were unable to afford the larger models. Sales were disappointing.

From an engineering standpoint, the chest model is most commendable. Because it opens from the top, there is scant entrance of heat when the lid is lifted. Its shape and simple type of construction make it simple and economical to build. It occupies little space in the kitchen. Yet, in spite of all these advantages, and notwithstanding the fact that it retails for \$30 to \$40 less than the smallest model of a "standard" line, the chest model has not been popular.

Crosley abandoned the lift-lid type of construction, and had for 1935 a 2-cu. ft. box and a 3-cu. ft. box with conventional, front-opening doors. In its promotion Crosley said that this change enabled the purchaser to use the top of the refrigerator as a kitchen table; but the real reason for the change was that of making the box look more like a refrigerator, so that people would buy it.

Good Unit for Export

Somewhat surprisingly, more than half of the total production (this estimate is corroborated by three different manufacturers) has been exported abroad. France is a good market for chest models, and so is England. Electrolux has done a fine business in England with a 1-cu. ft. model.

In America General Electric probably did the best job—largely because of its excellent and consistent promotion. Or perhaps the fact that the G-E Liftop carried a somewhat longer discount than other chest models—which permitted the salesman to receive a discount substantial enough to make it worth his while—was responsible. Further, General Electric has learned a good deal about the technique of selling a refrigerator which doesn't look like other refrigerators.

The leading American purchasers of chest models are public utilities. That is not surprising, for almost no other class of resale customers could be interested in the chest models. Profit margins on these midget boxes were too small to interest department stores or specialty selling organizations.

Even utilities were stumped for a while by the chest models, for they apparently didn't appeal to prospects. In the Tennessee Valley, for which these boxes had been designed originally, thumbs down were turned on the chest models everywhere.

The public utilities discovered that chest models could be rented in large numbers, and that in this capacity they serve as an excellent promotional medium.

Large Quantity Buyers

As a result, these central station merchandising departments are buying chest models in lots of a thousand at a time—a practice which just suits the manufacturers, for they hadn't made any money out of chest models, either, selling them two or three units at a time.

The procedure of renting chest models is simply this: an emissary from the public utility—possibly the meter reader or bill collector, or sometimes a canvasser hired and trained especially for the job—calls on a customer of the utility and tells about these new, small electric refrigerators which the central station is willing to rent for \$1.00 (in some places, \$1.50 and \$2.00) per month.

The canvasser suggests that the utility customer allow this refrigerator to be installed in his home, pointing out that the combined rent and operating costs will be considerably less than ice bills. General practice is to have these canvassers call only on customers whose electrical bills are in the lowest classification.

Rent Applied on Purchase

A few utilities which are renting chest models allow the rent money to apply on the purchase of the refrigerator. Most, however, refuse to sell it, preferring to turn the names of prospects obtained in this manner over to local dealers in the hope that the latter can sell them larger boxes.

Once a family gets accustomed to the convenience of electric refrigeration in their home, of course, it becomes easy to sell them a full-sized refrigerator on the easy terms which are available today.

Some utilities expedite this procedure by putting a time limit on the length of time they will rent a chest model to any particular home; i. e., after a rental period of, say, nine months, the chest is removed from the premises.

So long as this practice is confined to wired homes in the lowest income brackets—homes which normally would be considered poor prospects for dealers and salesmen—it would seem that it should be a commendable one. When families which have previously believed that electric refrigeration was simply out of the question on their limited budgets see for themselves how little it costs,

(Continued on Page 10, Column 1)

Meter-Ator Increases Sales, Utilities Say

DETROIT—As a result of the adoption this year of the Meter-Ator plan of selling Kelvinator products, a number of utilities throughout the country have announced sales increases ranging from 25 to 50%, reports R. H. Davison, manager of the personnel division of domestic sales for Kelvinator Corp.

A 50% increase in sales was announced by Graham Polk of Community Public Service, Fort Worth, who has recommended the extension of the selling plan to all 12 divisions in three states.

Gerard L. Austin of Bangor Hydro Electric Co. reports a 45% business increase, Robert Giedd of Virginia Public Service a 30% increase in domestic sales, and F. A. Coffin of the Milwaukee Electric Railway & Light Co., Milwaukee, approximately 25%.

Burns Salesmen Get Atlantic City Trip

PHILADELPHIA—For selling half a million dollars worth of General Electric appliances during a seven-week sales campaign, 248 members of the Judson C. Burns distributorship here were guests on a one-day trip to Atlantic City, Aug. 10.

Star salesmen of the Burns organization, dealers and their salesmen, members of the office force, warehouse, delivery, and service divisions took the one-day outing.

Miss Edna Murray of Delaware Power & Light Co. sold approximately \$14,000 worth of G-E refrigerators and ranges and achieved the most outstanding individual record during the campaign. High dealer record was that of William E. Gilbert of West Chester, Pa., whose organization sold 186% of quota.

Headquarters for the group were at the Ritz-Carlton hotel. William F. Casey, commissioner of public works, welcomed the group to Atlantic City on behalf of the mayor and presented them with a key to the city.

Appliances covered in the campaign included G-E refrigerators, laundry equipment, ranges dishwashers, and vacuum cleaners.

Caswell Test Mailing Brings 37% Returns

DETROIT—In a test direct-mail campaign offering a give-away booklet, "How to Buy Meats for Home Consumption," Caswell, Inc., General Electric Michigan distributor, received an average of 37% requests for every 1,000 letters sent out.

The test campaign revealed that a greater number of replies came in answer to the letters sent out in the name of General Electric than to the first series of "blind" letters, written in the name of a well known local radio home economist.

The booklet, which is the first in a "Dictionary of Food" series being issued by G-E, contains information on the various cuts of meat; how to judge quality from poor grades; how to buy and prepare inexpensive cuts of meat in an appetizing manner; and even a chapter showing father how to carve a duck.

The series and the accompanying direct-mail campaign were planned by the national sales division of Advertising Services, Inc., Detroit.

Erdmann Joins Promotion Staff of Westinghouse

MANSFIELD—G. W. Erdmann, Jr., joined the advertising and sales promotion department of Westinghouse Electric & Mfg. Co., S. D. Mahan, merchandise advertising manager announces.

Mr. Erdmann fills the post previously occupied by Bob Lynch, who is now south-central division sales promotion manager. He has been for two years a retail salesman for L. E. Tompkins, Inc., Cleveland, and was before that on the advertising staff of *The Cleveland News*.

In his new position, Mr. Erdmann will handle most of the details of The Quota Buster's Club, and will work with retail men in the field.

Buffalo Store Modernized

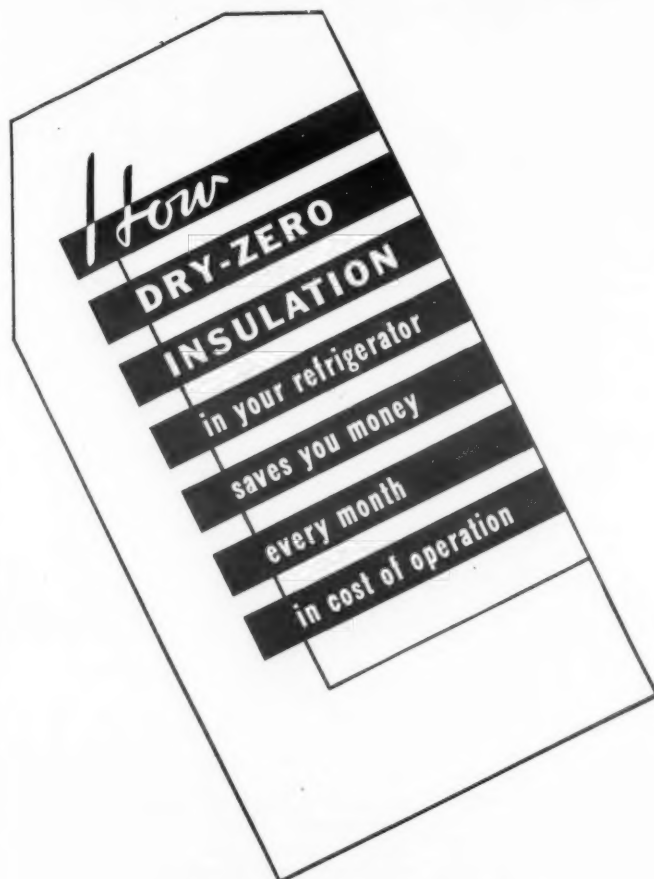
BUFFALO—Ontario Electric Co., Crosley distributor, has completely modernized its showrooms and now occupies an entire block in which six large show windows with permanent modernistic backgrounds give prominence to its products.

Sales records have reflected the improved display facilities and the opportunities dealers have to use the showrooms for closing sales, says George Eckel, sales promotion manager.

no more
sleepless nights



Dry-Zero offers a cure for PRICE-CUTTING Jitters



TWO EASY DOSES

If you handle refrigerators having Dry-Zero Insulation, have this prescription filled at once—

1. Write for a few samples of Dry-Zero Insulation.
2. Write for a supply of the powerful little folder—"How Dry-Zero Insulation in Your Refrigerator Saves you Money Every Month in Cost of Operation."

Stop being a "pillow-worrier!" Don't lose any more sleep racking your brain for a scheme to curb price-cutting. You can solve the problem easily if you are handling a refrigerator with Dry-Zero Insulation.

Here's how. When your prospect threatens to "take a walk" because he can save a few dollars at So-and-So's down the street, pull out your sample of Dry-Zero Insulation. Explain that it's the finest insulation money can buy . . . that elaborate laboratory tests prove it will save from 20c to \$2.00 a month in electricity cost. Ask him to compare this year-after-year saving with the few dollars saved by buying a cut-price refrigerator.

Then give him a Dry-Zero folder—"How Dry-Zero Insulation In Your Refrigerator Saves You Money Every Month in Cost of Operation." It tells the whole story . . . takes the polish off the cut-price lure . . . exposes the cheap, poorly insulated refrigerator for what it really is—a bad bargain at any price.

If you don't have Dry-Zero samples or Dry-Zero folders, write for them today.

DRY-ZERO
INSULATION
*The Most Efficient
Commercial Insulant Known*

Dry-Zero Corporation •

222 North Bank Drive
CHICAGO, ILLINOIS

• 687 Broadview Ave.
TORONTO, ONTARIO

APPLICATION OF SPECIALTY SELLING FORMULA TO REFRIGERATION

Refrigeration Industry Developed Own Methods of Selling A New Product

(Continued from Page 8, Column 5)

they then become ripe prospects for salesmen and dealers. The utilities boost the load on their lines, the dealers increase their volume, the customers step up their scale of living, and everyone is happy.

Selling Formula

Out of the accumulation of merchandising ideas which have been born in the heat of competitive struggle, the electric refrigeration industry has developed a sales procedure which very closely resembles a formula. This formula is used, with slight variations, by all of the manufacturers who have been leading the industry for the last few years.

Viewed broadly, the formula seems comparatively simple. A strong desire for an electric refrigerator is created in the mind of the public by aggressive advertising and promotional efforts. Prospects are ferreted out by cold canvass and by special stunts such as drawings, essay contests, and theater program tie-ups. These prospects are made "hot" by newspaper and direct-mail advertising.

Go Directly to Homes

Then carefully trained salesmen, who are taught exactly what to say and do at every turn, go directly to the homes of the prospects to get the orders.

Salesmen on showroom floors, skilled in another phase of the selling technique, take care of the "walk-in" traffic which comes in response to advertising and promotional efforts.

Viewed in detail, the formula becomes complex. Sales programs consisting of quotas, contests (highly important and often elaborate), direct-mail campaigns, sales training courses, educational sidelines, sales helps, sales talks, and sales themes must be worked out for the distributing organizations. The programs must be sold to the dealers and distributors at national and district conventions and gatherings of various sorts. After which sales department representatives must see to it that the programs are followed religiously.

Control is the key-word to the whole operation.

Conventions

Much stress is attached by industry executives to the human element in selling refrigerators, and as a result the number of conventions and meetings held during a year is legion.

At least once, and sometimes twice and three times, a year the distributors in each national organization gather at the factory or some central point and discuss discounts, plan campaigns, decide upon sales ideas and methods, hear advertising and promotional plans, look at new models, and trade ideas.

Following these gatherings of distributors, troupes of junior sales executives are sent out in the field to hold distributor-dealer meetings in the principal cities.

These conventions are well-planned affairs calculated to arouse a high degree of enthusiasm and impart a maximum of information and ideas in a minimum of time.

Playlets, movies, and other forms of dramatized selling ideas are usually part of the program.

Play usually occupies an important portion of these conventions. Especially is this true of the conclaves of contest winners and star salesmen who have made their quotas. Such "trips to the factory" are considered helpful sales stimulants. Occasionally such groups of leading salesmen are taken on junkets to Havana, Nassau, Bermuda, Catalina Island, and similar resorts.

Sales Schools

In the category of conventions is sometimes included the sales-trainings held by distributors and dealers. Sugar-coated with recreation, these sales schools are meant to augment the training received by the salesmen when they were first employed.

Executives believe that salesmen's ideas can stand a thorough renovation and overhauling periodically, and that the best way to present new sales ideas, the lessons learned from further experience, and the new sales tools developed by headquarters is by oral and visual demonstration.

Further education of salesmen is made available through correspondence schools.

Sales Contests

Almost as important as the convention in the present scheme of distributing electric refrigerators is the sales contest. Some distributors keep contests running continuously and even overlapping.

Most of the larger manufacturers conduct two or three national contests during a year with appropriate and sometimes highly valuable prizes for winning distributors, dealers, and salesmen.

Sales contests are recognition of the fact that salesmen are natural-born sportsmen. The fact that they are willing to work on a commission basis indicates that they like to gamble on themselves and the product they are representing.

They love a competitive fight, and one way to keep them from expressing this urge in terms of fighting competitive products (instead of selling their own machines) is to start them battling among themselves in a friendly struggle for personal supremacy.

Devices of this sort have enabled the salesmen to see themselves in the picture, and have helped them preserve their ego and morale under the constant fire brought upon them by the nature of the job.

Winners are honored, feted, and hobnob with the officials of the company. And by magnifying importance of their salesmen, sales managers have been able to inspire increased effort and bind these men more closely to their home organization.

Salesmen's Compensation

Salesmen are without doubt the backbone of any specialty selling business. But how to pay salesmen seems to be a problem which specialty selling organizations have never quite solved.

This is particularly true in the electric refrigeration industry, which has experienced a turn-over of salesmen extraordinary even for a specialty appliance business.

The big problem, of course, is that of figuring out a basis of compensation which will give the salesman an incentive to make sales at a profit both to himself and to his company. The plan must not only be fair to both parties, but must actually stimulate sales.

Types of Compensation Plans

Salesmen's compensation plans can be separated into the following classifications: (1) Straight salary; (2) straight commission; (3) salary plus commission or bonus; (4) drawing account against commissions and bonus.

Of these the first is used only by department stores, chain stores (like those operated by the mail-order houses), and other very large retail outlets.

The second, straight commission, has been the compensation method most extensively utilized by the majority of dealers in the electric refrigeration industry.

The third is used by some department stores, and by many factory branches and "master" (distributor-controlled) dealerships. It is to the fourth method, however, that the industry is turning more and more.

Effect of Depression

During the worst years of the depression, electric refrigeration sales organizations had few worries about salesmen's compensations. Hundreds of thousands of really competent and able men were jobless and footloose, and the retail sales managers had but to insert classified advertisements in the newspapers to get a flock of high-grade candidates for straight-commission jobs.

These men, when selected, worked hard for a while, sold to friends, relatives and neighbors, and then generally passed out of the picture when the season's selling activity had died down to a point at which they could no longer make a decent living on a straight-commission basis.

Next season a new set of salesmen would be trained, and the cycle would be repeated. It was cheaper, dealers and distributors found, to train salesmen than to pay them.

Competent Men No Longer Available

In the last year or so, however, this formula hasn't worked so well. Competent men are no longer walking the streets in great numbers looking for "anything." Moreover, a considerable number of prospective salesmen have tried it once, and won't

be sold so easily on giving it another whirl.

Too, manufacturers and distributors have become more ambitious in the matter of selling a number of different specialty lines, and now need large, well-trained sales staffs the year-round. So a new approach to the problem of compensating salesmen is indicated, in order that more and better men may be drawn into specialty selling as a means of livelihood.

Provide Living Wage

Those who have been studying this situation closely will tell you that a good salesmen's compensation plan should provide more than a living wage, should encourage the sale of the most profitable items on the list, should attract and keep high-grade men, should provide incentive for greater volume than normal efforts would obtain, should be easily understood by the salesmen, should offer definite goals and standards of activity measurement, should be flexible in meeting changing conditions, should permit effective control of salesmen, should present inducements for missionary work, and yet should not endanger the profits of the owner or operator. That's a pretty large order.

Most retail sales managers have found that some sort of "hook" is necessary in setting up a commission-and-bonus plan for salesmen, so that men who make their quota may be rewarded commensurately, and those who do not can be penalized.

Use of Bonus System

If a salesman is a real producer he should be encouraged with adequate pay and, contrarilywise, if he is "dead-weight" material, the company should not be asked to support him. Put another way, the financial reward of good salesmen should not be diminished by the keeping of second raters on the payroll.

This "hook" can easily be provided by withholding part of the commission until the end of the month, and then paying it out in the form of a bonus to those who have surpassed quota.

For example: Suppose a dealer decides to pay his salesmen 12½% commission on every refrigerator sold. He announces to the salesmen that this commission will be 10% on each box, with a bonus of 2½% (or more) per box at the end of each month to every salesman who makes his quota.

Bank Method for Winter Months

A variation of this commission-and-bonus system withholds the payment of this bonus until winter time, so that good salesmen may be retained on the payroll all year-round.

For instance, during eight months of the year a salesman may accumulate bonus money in a savings account kept for him by his sales manager. Then "when winter comes," say from December to March, this bonus accumulation may be doled out weekly or monthly.

If the salesman doesn't stick with the company, he doesn't get this bonus money.

Another effective scheme is to pay out an annual bonus just before Christmas to all those who have made their quota for the year, and who are still with the company.

Almost any compensation plan will work when you have the right kind of men and the right kind of supervision. But in order to get the right kind of men, dealers and distributors are beginning to find it more and more necessary to devise some plan of a nature similar to that outlined above.

Advertising

Manufacturers of electric refrigerators advertise heavily in national magazines and newspapers, and provide enormous quantities of direct advertising material for use by their distributor and dealer organizations. Advertising appropriations run into millions of dollars.

Radio programs, outdoor advertising, electric signs, and almost every known form of publicity are used on a large scale by the industry.

Distributors and dealers do considerable advertising in local newspapers (much of it on a cooperative basis with manufacturers) and are active with promotional stunts of various kinds.

Direct mail campaigns created by some of the larger manufacturers are frequently awarded prizes at advertising exhibitions.

Fewer Magazines

Appropriations for national advertising on the part of individual electric refrigerator manufacturers frequently run well into six figures.

On what basis are the Chosen Few magazines selected? For the most part, those which can present the heaviest assemblage of data, the biggest charts, and the most complete

circulation breakdowns seem to be getting the orders. Editorial content, and use by other refrigeration advertisers, also count.

Some tongue-in-the-cheek advertising agency men will tell you that cynical old rule: "Find out what magazines the client reads, and then place his advertising in them" still holds. But only a few. Most agency men are on a constant hunt for statistics with which to prove their case.

Men from other industries are wont to credit heavy and expensive promotional campaigns for the success of electric refrigeration. If this be true, it would appear that the industry is headed for still greater heights; because 1936 will show even greater, and possibly smarter, promotional efforts than have been put forth in previous years.

Home Service

The larger manufacturers maintain home service directors who study food research problems and prepare booklets, who help distributors organize local departments and who direct and correlate the work of these departments, and conduct "cold cooking" demonstrations in various parts of the country.

Functions of a home service department are many. First and most obvious of these functions is research. Recipes can be devised, tested, and published. The best methods of using a refrigerator and handling refrigerated foods can be determined. New uses for an electric refrigerator may be discovered. And sometimes home economists make useful suggestions—derived from constant use of their refrigerators—concerning design, which are incorporated in new models.

Home economists have also proved valuable in the field of customer relations. Sales managers have laid considerable emphasis on "using the user" to get new leads and to help clinch sales; and often the home service girl is the one selected to follow up sales, show new owners how to get the most out of their refrigerators, present recipe books and accessories, and in general, keep users well satisfied.

Recently a demand has arisen for home service girls who are good merchandisers. While these home service workers may not actually go out and ring doorbells, they put up strong sales talks when they get groups of women together for demonstrations.

The chief reason for the employment of home service girls is that they can talk the language of the housewife.

They are not concerned with gadgets and mechanism, but with food, its preservation and preparation. They know just what features of an electric refrigerator appeal most to women.

And since it is the woman who uses the electric refrigerator, specialty selling companies have learned the advisability of having feminine minds and hands help bridge the gap between the engineers who design and manufacture these machines and the women in whose kitchens they are installed.

Non-Exclusive Dealers

Surveys have disclosed that the industry's dealer body has contracted materially. Almost all manufacturers now have fewer dealers on their rosters than they had a couple of years ago. That, coupled with the fact that the number of manufacturers has diminished, makes it seem obvious that electric refrigeration dealers are not so numerous as in times past.

Still another item to be taken into account is the growth of multiple dealerships—retail outlets which handle two or more different makes of refrigerators.

It has not been so long since manufacturers would have been shocked at even the idea of multiple dealerships. But department stores broke the ice, and now—deplorable as it still seems to some manufacturers, the practice of stocking more than one make has become fairly prevalent.

Utilities, which used to account for the biggest share of the industry's distribution, have lost ground—although they are an important factor.

Master retail outlets—controlled by manufacturers or distributors—in metropolitan areas continue to be major merchandisers of electric refrigerators. A few hundred of these aggressive dealerships, combined with less than a hundred strong department and furniture stores, obtain well over half the year's business.

Two Schools of Thought

There seem to be two schools of thought relative to the proper approach to be made toward dealer organizations. One group—which in-

cludes in its number some of the oldest and wisest sales heads in the industry—believes it recognizes an inevitable trend toward concentration of retail sales in the hands of fewer and better dealers. The other group—composed largely of "young bloods"—pins its faith to independent dealers and wants to gather up dealers in the highways and byways, to capture the small town market.

Sales managers of the first group will figure out how to interest strong, thorn-in-the-side competing dealers into switching franchises.

Or they will do the next best thing and try to make exclusive dealers become multiple dealerships. They will most certainly be hot after the department store and furniture store trade.

Some of the older manufacturers with strong utility connections have detected renewed signs of life and activity in central station merchandising departments, and are greatly encouraged by the prospect of the old-time vigor on the part of this class of outlet.

Still others are moving in the direction of company-owned stores and more master retail outlets controlled by manufacturer, distributor, or both.

Some manufacturers claim they aren't interested in establishing, or even encouraging, dealers in towns of less than 5,000. Others plan to make strong campaigns to line up small-town dealers—particularly in the South and Far West.

Making Money

One of the commonest criticisms of the electric refrigeration industry is that "nobody has made any money out of it." Radio, it has been pointed out, produced a number of millionaires (Powell Crosley, William C. Grunow, and William Sparks—all of whom are now making refrigerators also—are cases in point).

No individual millionaires seem to have appeared as a result of the refrigeration business, however.

True, concerns like General Electric, Frigidaire, Norge, and Westinghouse may have made a good deal of money out of the business.

In fact, the president of one of the largest refrigeration manufacturers, which is a part of a still larger corporation, is quoted as having said that refrigeration paid the dividends of his mighty corporation during the depression years.

But whether or not these big concerns are making money few will ever know, because their profit-and-loss statements become part of the statements of their parent corporations, and are lost in the general shuffle.

To pursue the matter further, there was a time not so long ago when refrigeration distributors were going "broke" with dizzying rapidity. Keeping up-to-date the card index files of distributors was, for instance, a tough problem in 1932. Franchises were being changed in various cities seemingly overnight.

Most of the larger manufacturers had to reach into the sock and pass some of their own money around in order to keep their distribution organizations intact. General Electric and Westinghouse reverted to their Supply House factory jobbers in some sections. Frigidaire established more and more branches to fill the breach. Other manufacturers were left completely uncovered in many territories. And so it went.

Some retailers, the good ones, have found the sale of electric refrigerators quite profitable. The poor ones, and these are in the vast majority, haven't made enough to suit them.

The case can be carried still further. If a salesman made \$1,500 selling electric refrigerators in 1935 he was a humdinger. The very best in all the nation—men like the G-E Toppers, the Norge Vikings, the Westinghouse Quota Busters, and the Frigidaire BTU Club—general earned from \$2,000 to \$3,000 per annum. A handful of outstanding exceptions piled up commissions totaling \$4,000 to \$5,000.

Too Much Competition

Why no more money in selling electric refrigerators? Perhaps the best reason is a surplus of competition.

Too many manufacturers, too many distributors, and too many dealers—all in the same concentrated territories—helped the depression push prices downward.

Sometimes prices were knocked down by cutting the quality of the product; more often by reducing the discounts.

With the lower retail prices, small discounts, and reduced volume, it has been hard for many sales organizations to come out even the past few years.

Rising prices this year, plus more substantial discounts and fewer competitors, indicate to some observers

(Continued on Page 12, Column 1)

Volume Selling at Low Marginal Prices Is Basis of Dept. Stores' Ten Years in Refrigeration

OCCUPYING a peculiar position as a proved volume-building retailing division of the industry, while acting at the same time as a target for dealer-distributor complaints, department stores, a most important division of the refrigeration merchandising fraternity, climbed on the electric refrigeration bandwagon shortly after expanded production and distribution became widespread in 1926.

Reliable statistics on department store sales of electric refrigerators 10 years ago are scant—and statistics remained in the dark until the turn of the thirties—but it is known that several of the larger houses in metropolitan areas used "electric ice boxes" as eighth-wonder-of-the-world display promotion as much as 20 years ago. Sales in those days were few, partly because of the undeveloped nature of the product, and partly because the department stores didn't know what to do with it.

When the Society for Electrical Development called industry leaders together in the early fall of 1926 to launch organized promotion plans, they were impressed by the belief that department stores were selling about one-half of the country's electrical appliances. The indicated course of action, they agreed, was to cultivate these merchandising giants, and the S. E. D. plan incorporated numerous department stores as members of local chapters with their respective power companies.

Managers Hesitant

But regardless of the attractiveness of the profit possibilities in selling electric refrigerators, department store managers were wary. They had burnt their fingers before in pushing undeveloped products. Manufacturers and dealers said that electric refrigeration had arrived—but the public was still to be convinced. So they sparred with the idea, doing a small business, while they awaited an opening.

The "opening" at last they made themselves, by utilizing merchandising policies which had long cluttered up their own backyards. Volume selling at low marginal prices was the foundation stone of department store progress. Undersell the independent dealer, take advantage of your superior display facilities and advertising space, insure rapid turnover—and you are made—so ran the timeworn department store theory.

Public Responded Quickly

The buying public flocked through department store doors to see the new sensation attractively displayed against eye-catching surroundings. Department store men recognized the attraction of bright lights, and capitalized upon it well in advance of most competitive dealers. Manufacturers soon were getting sizable orders from department stores.

Almost as swiftly arose the cry of "price cutting!" from the independent dealer and small-scale distributor. The dealers complained that they were losing business because department stores were selling below list prices, the public naturally was taking advantage of the saving, and the department stores were using their mass buying power as a club to hammer larger discounts out of manufacturers.

But nothing much could be done about it, it seemed, at the time. There was no regulatory agency in the manufacturers' ranks to compel department stores to sell at factory list prices, and the profit attraction of selling in large orders to department stores was too great for companies to resist. After all, the idea—the fostering of "electric refrigeration consciousness"—was being put across to the thousands who passed every hour through department store doors and the manufacturers were pleased with the results. The small dealers could weather the storm, they reasoned, and there should be plenty of business for all.

Wanamaker's a Pioneer

John Wanamaker's in New York, one of the first large department stores to pioneer electric refrigeration selling, conducted a display of 12 brands in August, 1927, and sold \$30,000 worth of electric refrigerators in a few days. That was a revelation to merchandise managers of other department stores, many of whom now began to take a serious interest in this product.

Seeking to survey merchandising methods and sales programs of department stores, ELECTRIC REFRIGERATION NEWS in the fall of 1927, called upon several managers to cite their experiences in the field.

Daniels & Fisher, Denver's sole department store retailer of electric refrigerators, reported a one-year

service plan with no trial installation or home demonstration and a booming business. The Colorado store management believed in doing its selling on its own floor, and ran a series of six window displays during the hottest months of the year.

Using a single brand for promotion, J. Bacon & Sons of Louisville, Ky., turned its stock eight times in a six months' selling campaign.

Shuster's, Milwaukee department store, reported building electric refrigeration promotion through companion appliance selling, following up leads on small electrical articles to spring the idea of electric refrigerators.

Conclusions drawn from this survey, as complete as could be obtained at the time, led ELECTRIC REFRIGERATION NEWS to express the opinion that manufacturing organizations were looking longingly at department stores as outlets, but that the cut price situation was exceedingly risky at a time when retail competition was beginning to make its effect felt on all sides.

Stick to 'Over-Counter' Sales

Throughout the period 1926-31, department stores confined their efforts mainly to promoting "over-the-counter" sales and straightening out some of their own muddled affairs caused by stocking too many brands, failing to develop outside selling by their sales organizations, and neglecting to tie-in electric refrigeration as a companion line to other electrical products.

Retailing, however, was not confined to selling solely to the household trade. Rudge & Guenzel, Lincoln, Nebr., department store reported selling \$60,000 worth of electric refrigerators in 60 days at the outset of 1928, including an apartment house installation of 38 units. Distributors and dealers often reported being "bumped" on an apartment house deal by a wide-awake department store sales organization which waved reduced prices before the owner's eyes and got his name on the line.

'Eye Appeal' Comes to Fore

Department store newspaper advertising before the fall of 1929 was heavy, of the spread variety, but after the business depression had sunk its teeth into the nation's pocketbook the appeal of low prices was tied in with eye-catching newspaper displays on other merchandise offered by the store.

Eye appeal alone seemed sufficient to sell electric refrigeration in those days, as far as department stores were concerned. Ernst Kern, Detroit store, placed its electric refrigeration display on the ninth floor in July, 1930, and sold 1,000 Absopures in a five months' period. The mountain would come to Mohamet, if Mohamet had something attractive and useful to sell, Kern's executives reasoned.

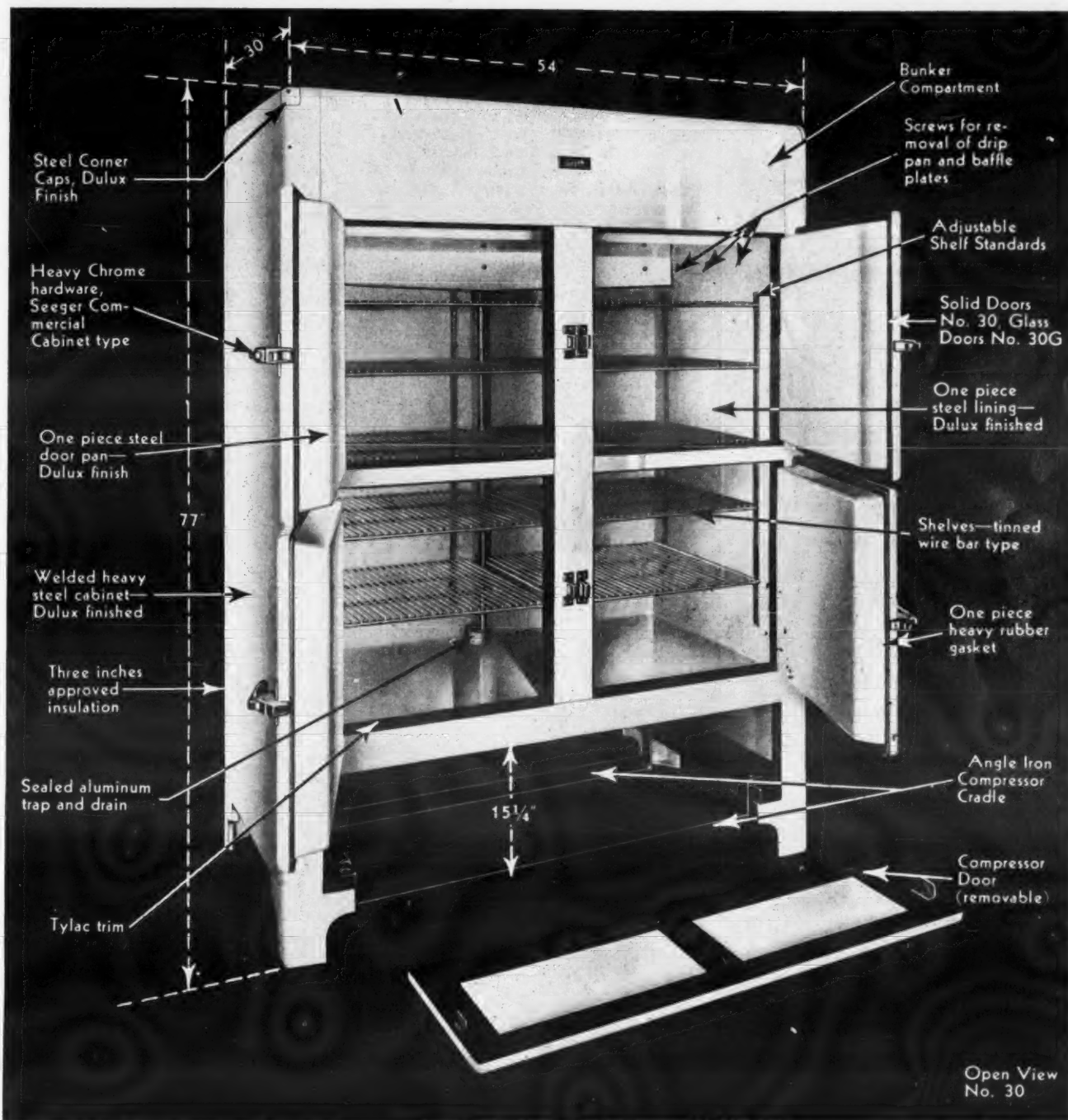
During the first depression years, electric refrigerators of inferior quality were bought in large quantities by department stores seeking to repair lost retail volume. Manufacturers took smaller stock models and shaved them down to all but the bare essentials to make the \$100 price level. The idea took hold as long as the public was in a price mood, but as soon as multitudinous service calls came in to department stores' refrigeration departments, enthusiasm waned.

Department stores loomed even larger in the merchandising set-up of 1932. Even though some observers felt that department stores received attention from executives far out of proportion to their actual sales volume, it is true that their influence was a dominant one in the shaping of most manufacturers' policies and programs.

New manufacturers and department stores clicked well: the newer manufacturers who were springing up secured ready-made outlets through department stores selling directly to the public, thus doing away with the expense and difficulties of setting up a distributing organization (and advertising and promotion). On the other side of the fence, the department stores found among the newer manufacturers a readiness to comply with their demands for a below-\$100 electric refrigerator.

Small dealers had increasing difficulty in financing time payments, (Continued on Page 13, Column 1)

Seeger PRICE LEADER "THIRTY"



The most sensational sales producer of the decade. This New, Low Priced Cabinet by Seeger, outstanding from every point of view, has a ready market in thousands of small stores and eating houses throughout the entire country. From coast to coast—Hamburger—Red Hot—Bar-B-Cue Stands and Lobster Shacks, will now be able to own a first class Seeger-Made Cabinet, at a price they can afford to pay.

Seeger Price Leader "Thirty" is built for self-contained Electric Refrigeration and Conditioned Air. It has everything—all-steel cabinet—adjustable shelves—Tylac door trim—Dulux Finish—extra fine chrome hardware—solid steel Dulux finish or Glass Doors.

LIST PRICES:

Seeger 30—\$275.00 Seeger 30G—\$300.00

6-Door Model in this type is Seeger 53

Compare these prices and don't miss the opportunity of many sales and big profits.

SEEGER REFRIGERATOR CO.

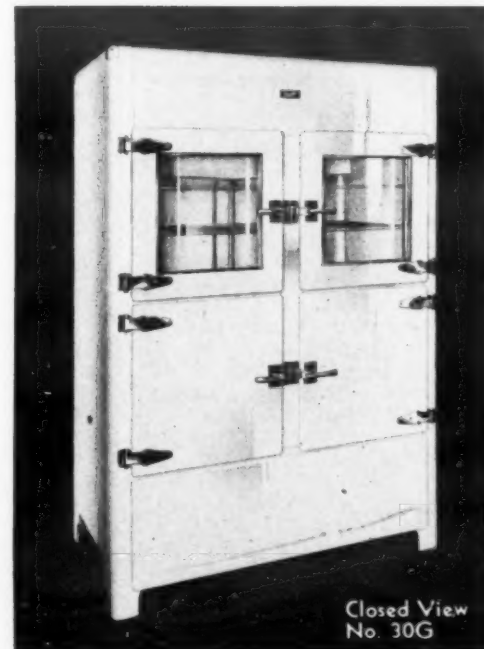
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Special Representatives:

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We regret to state that September 25th is the earliest date shipment of new orders can be assured, as the two original production orders, and over half of the third, are completely sold out.



Effect of Electric Kitchens on Refrigeration Industry; Growth Of Department Stores Sales

(Continued from Page 10, Column 5)
that the money-making period of the refrigeration industry may be arriving.

Apartment House Sales

So successfully has the industry established electric refrigeration as a necessity for apartment houses that no apartment house is now considered modern or fully equipped without it. In some cities the saturation of this market is comparatively high.

Although small individual unit refrigerators are now being installed in considerable quantities in apartment houses, it was the multiple system (a number of boxes refrigerated by one or more machines in the basement) which made apartment house electric refrigeration popular.

Use of Multiple Systems

Some of the earlier multiple systems installed have not been altogether satisfactory, and at times there has been agitation against them for safety reasons.

Today the multiple system seems to be accepted as suitable for certain requirements, and little trouble with them is experienced.

It would be difficult to calculate the effect that the introduction of mechanical refrigeration into apartment houses has had upon the market for all types of refrigeration equipment.

Apartment house dwellers have become accustomed to the convenience of electric refrigerators, have spread the story among their friends, and have purchased household models when they moved into individual homes.

Effect on Commercial Market

Apartment users, and others, have also helped the commercial market by their attitude toward the refrigeration equipment of the food retailers who serve them.

The ready acceptance which electric refrigeration enjoyed among apartment house owners drew many building suppliers into the business.

Especially in the larger cities there sprang up a number of electric refrigeration firms which operate only locally, supplying private brand refrigeration to apartment houses.

Inasmuch as this type of entrepreneur knew his market and his potential customers well, he helped make competition in the apartment house field unusually keen.

Most distributors maintain wholesale divisions, with a special corps of salesmen, to sell apartment landlords.

All-Electric Kitchens

Indications are now pointing toward the development of the apartment house market for complete all-electric kitchens by electric refrigeration sales organizations. The idea is being pushed especially by large manufacturing concerns which make a full line of kitchen appliances, including refrigerators, ranges, dishwashers, food mixers, ventilating fans, clocks, and other devices.

By selling all these appliances as a single unit, one salesman can obtain the entire order, instead of six salesmen trying to interest the builder in each of the half-dozen appliances which might go into a modern kitchen. When the installation is made a part of the complete home, the cost is added into the building budget and financed on a long-time payment basis. A kitchen planning service is usually included with such a sale.

Manufacturers hope that the advertising value of an all-electric kitchen will appeal to publicity-minded builders and operators in much the same manner that electric refrigeration has.

Pushed by G-E and Westinghouse

General Electric and Westinghouse have been the chief proponents of this idea; although a number of specialty distributors have obtained franchises from various manufacturers for the different appliances which, installed together, make up an all-electric kitchen, and have been selling these complete kitchens under their own brand names.

General Electric now has on the road a number of traveling (aerocar) all-electric kitchens, by means of which the idea can be taken to housewives and demonstrated right at their homes.

A potent sales "hook" in the presentation of the all-electric kitchen is that of kitchen planning. By efficient arrangement, lay-out, design, and coordination of equipment, housewives may be saved time, trouble, and effort.

Pursuing this idea, all-electric kitchen salesmen offer to furnish a scientific kitchen layout as an added inducement to purchase a coordinated set of appliances.

Builders, it has been found, appreciate such service—and buy the equipment specified in the plan partially to get the plan itself.

Kitchen Modernizing Bureau

Recently the National Electrical Manufacturers Association and the Edison Electric Institute joined hands to form the National Kitchen Modernizing Bureau. In the articles of organization, the founders of this Bureau state its purpose is "to promote the sales of electric refrigerators, ranges, water heaters, and other kitchen appliances."

The National Kitchen Modernizing Bureau is following closely the pattern, plan, and methods utilized by the Electric Refrigeration Bureau of the National Electric Light Association a few years ago; and many of the men who will guide the efforts of this new Bureau had executive experience in the previous one.

In profile, this highly effective plan of promoting the sale of an electrical appliance—in this case, several related electrical appliances—consists of banding utilities, manufacturers, and dealers together in a common, mutually profitable cause. Utilities profit by the addition of extra current load on their lines; manufacturers and dealers profit by increased appliance sales.

Sponsor Cooperative Advertising

The manufacturers contribute to a common fund for cooperative national advertising. Utilities and dealers tie up in local advertising campaigns.

The utilities also offer showroom space for cooperative exhibits, sponsor special "weeks," stage contests for both consumers and salesmen, put on public demonstrations (such as "cooking schools") and, in some instances, enter actively into the merchandising phase themselves.

Supported by funds from both manufacturers and utilities, a national headquarters staff organizes and coordinates the activities of local bureaus, prepares instructions for local campaigns and stunts, provides literature, issues bulletins and statistics on the progress of the drive, and generally keeps one or more field men on the road constantly, delivering inspirational speeches and consulting with local bureaus and committees.

Old Plan; New Adaptation

This plan has been followed with signal success in "putting across" a number of electrical appliances. But never before has it been used to promote a group of appliances.

As a result of this movement, electric refrigeration dealers may become "food equipment merchandisers," and make a specialty of helping the housewife put better meals on the table with less effort and at smaller cost.

Furniture stores have found that sometimes it pays to hold special sales of single high quality pieces, such as chairs, lamps, or tables at no-profit prices. Snatching at a bargain, a family will proudly acquire a handsome new chair. Once the chair is ensconced in the living room, however, the remainder of the furniture begins to look shabby by comparison. In due time a whole new outfit of equal quality is purchased to make the rest of the room, or even the entire home, meet the standard set by the new chair.

The appearance of a good-looking and efficient new electric refrigerator in a kitchen may have the same effect. The fuss and bother of an old coal stove may prompt the lady of the house to seek a new electric range which is as trouble-and-worry-free as her electric refrigerator. She may decide to look into the merits of electric dishwashers and water heaters. And should a salesman bring around one of the new food mixers and preparers, he may find her in a receptive mood.

Promotes Purchase of Matched Units

Such appliances offer electric refrigeration sales organizations an opportunity to take other kitchen appliances to their present owners and prospects. Few sales organizations will have such a valid claim to the giving of genuine service to the public as will the merchandisers of equipment for the handling of food.

Ensemble selling, as the joint merchandising of refrigerator, range, and dishwasher has come to be known, is receiving the benefit of the best thinking, planning, and promotion that can be bestowed upon it by the

major manufacturers of electrical household appliances. Undoubtedly this effort is going to result in a trend toward the buying of kitchen appliances as matched units; and the trend is one all alert distributing organizations will be quick to sense the advantages of, and to get their share of the profits therefrom.

In the concentration of attention upon the kitchen, however, good American appliance salesmen and sales managers don't overlook the opportunities for the sale of home electric refrigeration outside the kitchen.

Refrigeration for Use Outside the Kitchen

Some of the possibilities for the sale of home electric refrigeration outside the kitchen which interest salesmen in the off-season are:

(1) Ice-makers. In homes where plenty of entertaining is done, where large families are wont to gather and bring their friends, the need for an extra-large supply of ice cubes frequently becomes acute. Too many homes of this class simply buy 50-lb. cakes of ice for their parties (ice men will tell you that some of their best customers have electric refrigerators in their homes, but buy ice on the side because their ice cube supply is manifestly inadequate for their needs).

Families of this type can generally well afford an ice maker, prefer neat cubes to jagged chippings, and haven't bought ice makers because no salesman has been around to explain their merits.

Ice-makers are most often installed in large pantries—out of the way of the cooks, and hence come in the classification of outside-the-kitchen refrigeration.

Ice Cream Cabinets

(2) Ice cream cabinets. Families which entertain on a large scale rarely have refrigerators of sufficient capacity for their needs, even though they may have boxes of 9, 10, or 12-cu. ft. capacity installed in their kitchens. Adding another household refrigerator in such cases frequently is considered out of the question because of space limitations in the kitchen.

One exceedingly clever answer to this dilemma is the installation of an ice cream cabinet in the basement. Therein may be stored meats and vegetables purchased in quantities to effect savings, and to provide against the unexpected arrival of guests.

Moreover, larger cuts of meat may be bought and stored than could be accommodated by most household refrigerators. Kept at proper temperatures, this meat may be allowed to age and achieve a tenderness which will bring culinary fame to the host and hostess.

Beer Coolers and Bars

(3) Beer coolers and refrigerated bars. In most of the new homes now being erected by speculative builders, a private bar seems to be an accepted feature.

Electric refrigeration is a virtual necessity for the maintenance of proper temperatures for beer—a fact which makes it possible for this industry's salesmen to invade an almost virgin field.

(4) Portable refrigerated bars. This is an item which has been marketed by comparatively few manufacturers, and which, despite its obvious appeal for the luxury market, has not been sold in appreciable quantities. With the coming of better times, the dolled-up 3-cu. ft. refrigerator on casters, equipped with ice cube trays, paraphernalia for serving cocktails, and bottle storage facilities) responds to sales effort in a satisfactory manner—providing it gets proper promotion and sales effort.

(5) Florist refrigeration. Commercial vendors of flowers are not the only people who have need of florist refrigeration equipment. In some of the bigger homes a fresh supply of flowers becomes almost a daily necessity, like a daily supply of fresh food.

Families in the upper income brackets generally have their own gardens—extensive ones, too—and in many cases it can be demonstrated to them that the installation of florist refrigeration equipment will actually save them money, in addition to making available at all times a supply of flowers from their personal gardens.

Cheap Competition

It should be noted that all has not been beer and skittles in the electric refrigeration industry, despite its successful defiance of the depression. During the early part of the industry's history there were the usual difficulties which beset the pioneers—engineering troubles, financial problems, and the struggle to gain momentum. Later (around 1925 and 1926) the industry had a real boom, and overshot itself. Cleaning up the messes that followed as a result of this too optimistic promotion and wild spending of stockholders' money was a handicap which slowed down the industry considerably.

In 1931 and 1932, just when the industry seemed going best, there came a big influx of new manufacturers. Some of these manufacturers were large, well-established firms—makers of radios, chiefly. Others were of the "fly-by-night" variety, and assembled the cheapest, barest type of refrigerators to sell at low prices.

Sold Direct to Large Retailers

These "fly-by-nights" made exceedingly advantageous contracts with suppliers (who would take contracts to manufacture below cost simply to keep their idle plants running and maintain their staffs), and sold directly to large retail outlets. They did little or no advertising or sales promotion. Thus they were able to produce the first electric refrigerators to retail for less than \$100.

This cheap competition worried the older manufacturers. Most of them finally met the challenge by producing low-priced refrigerators themselves, which finally forced the opportunists to abandon the field.

Further difficulties arose during that time in distributor and dealer ranks. The thousands of small dealers which the industry had added in its period of rapid expansion were largely retail merchants who found themselves in almost desperate circumstances when the depression was at its height. It soon became difficult to hold them in line, and established prices were cut right and left.

'Chiseling' Enters Picture

The pernicious practice of "chiseling" arose. By "chiseling" was meant cutting prices so as to take sales away from dealers for the same product, as well as from competitors. Prospects would be all but "sold" by one dealer, when another dealer would enter the picture, quote a lower price, and make the sale.

The factor of unusual difficulty in financing time payments accounted for an even greater demise of dealers, for a heavy majority of all electric refrigerators are purchased on time payments.

Finance companies became quite "choosy" in their acceptance of dealer paper during 1932 and 1933.

They refused—on the ground that their overhead on such small accounts is too large to make them profitable—to do business with a dealer whose time payment paper does not exceed \$5,000 in one year. In many cases the ante was even higher.

Moreover, dealers were apparently unable to get much help from local banks.

Effect on Small Dealers

This situation, of course, put a strain on extensive distribution set-ups. Multitudes of small dealers lost heart because of the difficulty of financing their sales, and failed to put their best efforts into the business.

Distributors largely concentrated their labors on the more substantial dealers who can do a comparatively large volume of business, and whose business is more acceptable to the financing companies.

They also made a bigger play for department store outlets, which can do their own financing.

And many of them have themselves financed dealers who have proved their ability to go out and sell. Help has also come in some measure from factories and from public utilities.

Department Stores

Another difficulty was the department stores, which became genuinely prominent in the electric refrigeration merchandising picture for the first time in 1931, and which have become increasingly important in the last three years.

Sales managers and field representatives for electric refrigeration manufacturers have many times been at a loss to know how to deal with department stores.

No matter what discount is offered them, they never seem satisfied. And like the utilities, their might and independence make them extremely hard buyers.

A common department store formula—acquire a job lot, cut the price, advertise that price in newspapers, move a quantity in a short space of time, and then close the deal—has been worked over and over again with electric refrigerators.

These special sales have generally had a disconcerting effect on regular dealers. Nothing, field representatives claim, disturbs or frightens a dealer so much as a competitive advertisement—especially when that advertisement bears a department store's signature, and features, in large black type, a price lower than he can offer.

'Crucifying' Popular Line

Still another department store practice which has irked electric refrigeration men is that of "crucifying" an established, well-advertised make by using it as a "leader" and then selling customers a lower-priced, private brand, "just-as-good" refrigerator which is purchased directly from the manufacturer and on which the discount is greater.

Reasons for department stores' rise are easy to find. The department store has an already-established clientele, which through long experience is confident of the store's ability to make good on merchandise which is not satisfactory. Show windows on well-traveled thoroughfares, efficient and highly trained advertising departments are other department store advantages.

A customer does not have to worry about such a large organization as a department store going out of business. Furthermore, even as they are good financial risks for the manufacturer, department stores are a convenient place to purchase for the customer, because they can finance long-time payment plans.

Other Advantages of Stores

Added to the department stores' ability to finance installment paper are the advantages of their location, store traffic, reputation, appeal to women, and consistent advertising.

It has been noted that, although a department store is exceedingly style conscious—a good example is women's clothes—it will rarely pioneer a large item such as an appliance. The department store prefers, and increasingly so, a refrigerator which is an established piece of merchandise.

Having made their point by buying from "fly-by-nights"—thus forcing manufacturers and distributors to cut margins and supply them with refrigerators at much lower prices—department stores are now all set.

The store's service problem is reduced by handling standard makes, since distributorships and factory branches generally handle servicing of all units sold by the store.

Smaller manufacturers have come to depend on style or price to win sales from the line-up of competing makes on a department store floor.

Dumping Grounds

Price is still consistently played up in department store refrigeration advertising; and, as a corollary of this fact, it might be noted that department stores are still the principal dumping grounds for distress merchandise and out-of-date models.

No two manufacturing organizations have the same ideas concerning the best methods of conducting business relations with department stores. Policies on this subject have been consistently inconsistent.

Many stores have provided for thorough sales training courses for refrigeration salesmen, and in not a few cases have arranged for concentration of salesmen's effort on refrigeration alone or at least on fewer products than they sold in the past.

Test Specialty Selling Methods

Noting that the salesman who spends his day moving from one product to another usually becomes a mediocre salesman of all appliances, a master of none, appliance department managers have been working hard in the last year or so to establish real specialty selling methods within the walls of the store.

Many of the larger manufacturers of electric refrigerators have succeeded in getting department stores to install separate departments (such as the General Electric store-within-a-store) for the sale of their products. Others sell their refrigerators under another brand name to department stores. Some distributors furnish their own trained men for floor salesmen.

That old question of discounts is always a tough one, and is the major source of difficulties between manufacturers and department stores. Department stores need—and generally get—longer discounts than other retailers. The volume they handle justifies the additional slice off the manufacturers' prices accorded them. Trouble for the manufacturer, however, lies in reconciling the rest of his distributing organization to such special dispensations.

Simplest method of solving the dilemma is that of the manufacturer selling direct to the department store. That solution, however, generally can be utilized only by small manufacturers who have no national distributing organizations to reckon with, or by large manufacturers who choose to market their refrigerators thusly under different brand names.

Apparently it is next to impossible for a distributor to make money on the business he does through department stores, at the discounts they demand.

Treated as 'Prestige Accounts'

Manufacturers are constantly urging distributors to line up these non-profit "key accounts," however, and they have some pretty good arguments in favor of that policy—one of the best being that a strong department store is a "prestige account" which will not only aid acceptance of the product in that territory, but which will help the distributor sign up smaller dealers by its approval of the line.

One reason department stores have done so well is the fact that manufacturers have been willing to show them how.

(Continued on Page 14, Column 1)

Dept. Stores Found Ready Ally in New Manufacturers, Forcing Older Makers to Private Brands

(Continued from Page 11, Column 2) whereas the department stores could finance their own instalment paper. Location favored department stores, as well as store traffic, reputation, appeal to women, and consistent buying.

Yet the common department store formula—acquire a job lot, cut the price, advertise that price in newspapers, move a quantity in a short space of time, and then close the deal—worked a hardship on regular dealers who could not offer such a low price on their merchandise.

Private brand refrigerators came in 1932, manufactured expressly for department store merchandising by many of these new companies.

Frigidaire Sells Private Brand

Noting the large quantity of private brand units being sold to department stores by new companies, several older manufacturers—led by Frigidaire Corp.—began selling their lowest-priced refrigerators, nameplateless and a bit changed in appearance, directly to department stores.

A glance at numerous department store activities during 1932 is given in these items:

In January, R. H. Macy & Co. began selling its own line of refrigerators in colors. On May 7, Houghton & Dutton, Boston department store, reported 468 refrigerator sales in 12 hours.

Late in May Kelvinator Corp. established a special division to handle department store business. In June, Chicago's Marshall Field & Co. took on the Leonard refrigerator line.

Apex-Rotarex Corp. established a department store division in July. Early in September Detroit's Commerce Pattern & Foundry Co. announced that 2,800 Commerce refrigerators had been sold to department stores since January.

Marshall Field & Co. added the U. S. Hermetic refrigerator line in September. Early in November Crow-

ley-Milner Co., Detroit department store, offered Copeland refrigerators for \$99.95.

G-E's 'Controlled Plan'

In the same month General Electric announced its "controlled sales plan" for selling household appliances through department stores, and in December Copeland Products, Inc., established a department store division.

Under the terms of the G-E "controlled sales plan," distributors placed units in department stores on consignment, furnished floor and follow-up salesmen, and handled service. The department stores earned their commission by providing good display and floor space, advertising regularly, and financing time payment paper.

In 1932 reliable sources gave the News a figure of 11.7% as an estimate of the portion of total electric refrigeration sales made through department stores. For 1933, according to data obtained in the News survey, the figure came close to 22%.

Not a few manufacturers reported that in classification-by-volume of their retail outlets department stores headed the list for 1933.

Universal Cooler Sales Jump

Department store sales of Universal Cooler household models increased 15% during the first quarter of 1933 over the same period in 1932.

According to R. C. Cameron, manager of the department store division, G-E did more than 12 times as much department store business during the first half of 1933 as it did in the first half of 1932.

From the merchandising clinic held Oct. 17 and 18, 1933, at the General Electric specialty appliance sales department headquarters in Cleveland, attended by approximately 100 department store executives, much interesting information on department store merchandising practices developed.

Informal discussions of the round-table variety brought out the following conclusions at the conference: (1) Style would be even more important in 1934 than in 1933; (2) Department stores should not subsidize instalment selling; and (3) Outside selling has an important place in the department store appliance merchandising program.

Reasons for department stores' rise to prominence at that time are easy to find. The department store has an already-established clientele, which through long experience is confident of the store's ability to make good on merchandise which is not satisfactory. Show windows on well-traveled thoroughfares, efficient and highly trained advertising departments are other department store advantages.

Stores Convenient and Stable

A customer does not have to worry about an organization as large as a department store going out of business. Furthermore, even as they are good financial risks for the manufacturer, department stores are convenient for the customer because they can finance long-time payment plans with small initial deposits.

It has been noted that although a department store is exceedingly style conscious—a good example is women's clothes—it will rarely pioneer an item as large as a refrigerator. The department store prefers, and increasingly so, established merchandise.

Late in 1933 a general trend was noted among some of the large stores toward abandoning refrigerators made by small, little-known manufacturers.

Department store managers declared that there was little necessity for handling units made by these companies, since large manufacturers were making units priced sufficiently low to attract department store trade, and which already had gained some degree of public acceptance through national advertising. Having made their point by buying from "fly-by-nights"—thus forcing manufacturers and distributors to cut margins and supply them with refrigerators at much lower prices—department stores were all set.

The department store's service problem was further reduced by handling standard makes, since distributorships and factory branches generally

handle servicing of all units sold by the store, and by making contracts with the independent service companies which were beginning to appear.

Style and Price Predominant

Smaller manufacturers, consequently, came to depend on style or price to win sales from the line-up of competing makes on a department store floor. Many of these manufacturers dropped out of the picture entirely.

Price was still consistently played up in department store refrigeration advertising, however, and as a corollary to this fact, it might be noted that department stores were still the principal dumping grounds for distress merchandise and out-of-date models.

Few manufacturing organizations have had the same ideas concerning the best methods of conducting business relations with department stores. Policies on this subject have been consistently inconsistent.

In 1933 many stores provided for thorough sales training courses for refrigeration salesmen, and in not a few instances arranged for concentration of salesmen's effort on refrigeration alone, or at least on fewer products than they had been assigned in the past.

Specialty Selling Adopted

Noting that the salesman who spends his day moving from one product to another usually becomes a mediocre salesman of all appliances and master of none, some appliance department managers attempted to establish real specialty selling methods within the walls of the store.

A case in point was the well-known Frederick Loeser & Co. store in Brooklyn, which attributed its good sales record largely to adoption of specialty methods.

Definitely branching out from traditional department store selling methods in 1933, Mandel Brothers in Chicago stated that its electric refrigerator sales force was composed entirely of outside salesmen.

Many of the larger manufacturers of electric refrigerators succeeded in getting department stores to install separate departments (such as the General Electric store-within-a-store) for the sale of their products. Others sold their refrigerators under another

brand name to department stores. Some distributors furnished their own trained men for floor salesmen.

Proportion of Cash Sales High

Another department store trend was pointed out early in 1933 by the National Retail Dry Goods Association—that of more cash sales in comparison to total sales.

Department stores had, as we have seen, become increasingly important to the refrigeration industry. During 1934 the stores began to observe that refrigerators were becoming increasingly important to them.

As a consequence, 1934 saw the department stores abandon for the most part their emphasis on buying, and put the emphasis instead on selling. The result was the recognition that at least they had "arrived" as a major merchandising force in the refrigeration industry.

Price Recedes to Background

That is, where formerly these organizations bought refrigerators in job lots and at special discounts, and then tried to move them quickly in a special sale, they now were using intensive selling methods in their merchandising, stressing what electric refrigerators would do, and not making price their principal point.

It was, in other words, a new selling approach for department stores, an approach contrasting utterly with previous department store selling technique on any line of goods.

Naturally, then, they ceased to be regarded with fear by others in the industry. Instead of being the up-setter of electric refrigeration merchandising technique, the department store became the pace-setter.

From the moving of cut-price "jillolopy" refrigerators by catch-as-catch-can methods, department stores progressed to the setting up of special refrigeration divisions, with expert supervisors, trained salesmen, and definite promotion programs of highly constructive nature.

When department store executives met in their second annual Merchandising Clinic at Nela Park, Cleveland, on May 31, 1934, chief topic of debate was: Can a department store appliance salesman sell more than one line successfully? And though there

(Continued on Page 15, Column 1)

Fedders joins with ELECTRIC REFRIGERATION NEWS in celebrating ten years of service to the Refrigeration Industry. 1936 is also Fedders' Fortieth Anniversary of specialization in manufacturing Quality Heat Transfer Equipment.

1926 to 1936

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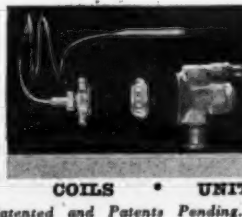
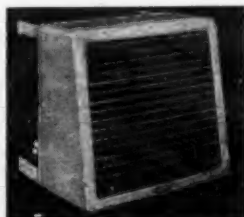
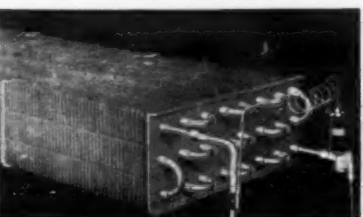
During ten years of working in double harness with the electric refrigeration industry, we have learned things that only experience can teach. Necessity may be the mother of invention, but experience is the father of hidden values.

In any technical product, what you CAN'T SEE is more important than what you can see. For instance, all Fedders refrigeration and air conditioning products are thoroughly cleaned and absolutely dehydrated by the most effective methods known to science. Electrically heated dehydrating ovens combined with 28 inch vacuum assure the removal of every trace of moisture,—destructive enemy of refrigeration systems.

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Patented and Patents Pending.

Effect of Time Payment & Meter Merchandising on Electric Refrigeration Sales

(Continued from Page 12, Column 5)

The principles of specialty selling are basically opposed to fundamental department store merchandising theory, and at first their introduction was bitterly opposed. Finally, however, most department stores came to specialty selling as the only logical answer to the problem of moving electrical appliances in profitable volume.

Importance Will Increase

The importance of department stores in electric refrigeration merchandising, far from being on the wane, will continue to increase for some years to come, most leaders of the industry concede.

When any product reaches a certain stage of public acceptance and saturation, it adapts itself readily to over-the-counter merchandising, and the department store becomes one of the most logical and important outlets for the product.

But refrigeration has not yet moved into the over-the-counter class. Buyers as yet do not flock to department stores in such numbers that the average refrigeration department can do a profitable business simply by putting some stock on the floor and advertising that it's there.

Department stores which do good volume business each year have to pull hard for it—have to find ways of pulling buyers to the department, and of closing sales that might go somewhere else without special attention.

Two Methods of Selling Employed

The two ways in which department stores can do a job of refrigeration selling are by the use of straight merchandising, where advertising and floor traffic were depended on for business, and by a combination of merchandising and specialty selling methods.

Stores using the latter plan, sales managers find, usually show the largest volume of sales.

The department store resale operation, instead of taking business away from the small dealer, really helps him, insist some sales executives. The smart merchandising tactics practiced by department stores tend to make people more electrical appliance conscious—with the result that sales climb to the benefit of all retail outlets, it has been observed.

Time Payments and Coin-Meter Merchandising

Electric refrigeration time-payment notes have been highly attractive to the companies which make a business of discounting installment-sales paper. Some manufacturers, like General Electric, Frigidaire, and Kelvinator, have their own financing houses. Other manufacturers generally work out programs for their dealers with big financing concerns like Commercial Investment Trust Corp. and Commercial Credit Corp.

Practically all electric refrigerators are sold on time payments. Repossessions are said to be exceptionally low—normally less than two per cent.

FHA Guarantee of Sales

In 1935 a new factor entered the installment selling picture when the United States government, through its Federal Housing Administration, offered to guarantee dealer paper against losses up to 20% of the total obligations incurred by any financing agency discounting this paper. Thus dealers were relieved of the worry over the possibility of "reverts," and were enabled to offer the lowest terms in the history of the industry.

Finance companies were disturbed in 1931 by the introduction of coin-meter merchandising. By this plan a meter is attached to the refrigerator when it is placed in the customer's home. By dropping 25 cents in the meter—or 15 cents, or even a dime—refrigeration can be obtained for 24 hours.

Each month a collector empties the coin box, and the refrigerator stays in the customer's home so long as these payments are kept up. Generally refrigerators sold under this plan are installed without a down payment.

Used by Department Stores

It is among department stores that the meter plan of selling has been used the most extensively, and with the best results. Most department store selling is floor selling, anyway, and most department store refrigeration presentations are inadequate. So the coin-meter plan, which peculiarly seems to sell itself to certain types of prospects, has proved to be a genuine boon with many of the nation's leading merchant establishments.

It should be noted, however, that in those stores where the meter plan has been followed successfully for two or more years, an actively functioning credit department has invariably applied brakes at the proper moments. Nobody is allowed to take a refrigerator home on the quarter-a-day or 15-cents-a-day plan unless the credit department feels absolutely sure that that machine is likely to stay put.

Termed 'Sissy' Scheme

Genuine specialty selling organizations have been inclined to scoff at coin-meter merchandising as being a makeshift substitute for real salesmanship. The honest-to-John specialty selling organization executive, one who started on his career by leaning on doorbells, thinks of coin-meter selling as a "sissy" scheme.

After five years of it, however, refrigeration sales organizations are no closer to an agreement on the merits of coin-meter selling than they ever were.

Evidence is heavy that it is one of the quickest and most reliable methods of selling a large volume of refrigerators yet devised. On the other side the evidence is almost equally heavy that the scheme is almost the ruin of dealers who try it, and gives the whole refrigeration business a setback in the communities in which the plan is put into operation.

Public Utility Merchandising

During the early years of the industry, public utilities shouldered the burden of merchandising electric refrigerators, just as they have always pioneered new electrical appliances. Recently, however, their place in the picture has not been so important.

In the spring of 1931, bills to prohibit public utility merchandising were introduced in a number of state legislatures almost simultaneously. The campaign was led in each state by associations of retail merchants.

It caught the power company executives off guard. Before they could get their lines out, anti-utility legislation had been passed in Kansas and Oklahoma, and central station men were given good scares by several other state general assemblies.

Threat of Merchandising Ban

Under the leadership of President Kelly of the Fair Store in Chicago, a joint committee of the National Electric Light Association and the National Retail Dry Goods Association was formed to work out a set of merchandising principles and a code of ethics.

Since then organized retail merchants have made few overt attempts to force the passage of prohibitive legislation against their rivals. But they have been using this club as a threat. So effective has the threat been that utility merchandising has ebbed unusually low.

While it is true that utilities in general are "lying low" because of the agitation aroused in 1931 against their merchandising activities, their merchandising retrenchment has been caused in large part by general business conditions.

Shrinkage in stock values, and other depression manifestations, put many utility holding companies in a jam. They had to call on their properties, the operating companies, for help.

Thus it was that central stations which had been doing a good merchandising job found themselves without funds to buy display stocks of refrigerators, to promote their sale, to hire and train salesmen, or to finance time payment purchases.

Effect of TVA Demands

In the Tennessee Valley area during 1935 renewed and feverish merchandising activity on the part of southern utilities was forced by the machinations of the TVA, which threatened annihilation to utilities in that sector unless their rates were reduced sharply. As a result central station merchandising departments started selling "TVA interim model" refrigerators (4-cu.ft. Conventional models at cut prices) in a big way—much to the distress of local dealers.

This action aroused so much animosity in dealer and distributor ranks that it was almost totally abandoned by the end of the year.

Refrigeration manufacturers and small dealers feel more kindly disposed toward utility merchandising since they have had a taste of department store merchandising.

Both Are Hard Customers

Some manufacturers welcomed the turn of the tide from utilities to department and furniture stores, because they found the utilities hard customers. They have now learned that the big retailers can be just as hard to deal with, and more so. As price cutters, department stores have no equal; and in the past some of them have been willing to take refrigerators made by irresponsible manufacturers if they couldn't get the quotations they wanted from reliable makers.

Utilities, of course, will not put a substandard machine on their lines if they have their way about it. Retailers appreciate that as well as manufacturers, which is another factor in the return to favor of central station merchandising departments.

Direct evidence of dealer-utility goodwill can be seen by such cooperative activities as that being sponsored by Consumers Power Co. of Michigan, which offers bonuses for electric ranges and water heaters installed on its power lines.

Companion Merchandise

With the trend toward lower prices, smaller gross profits per unit sale, greatly augmented numbers of competitors, and in some cases, fewer unit sales, has come a marked tendency on the part of electric refrigeration distributors and dealers to look around for lines of companion merchandise which they might add to refrigeration in order to rebuild dollar volume.

At first, leaders in the electric refrigeration industry insisted that franchises be granted only to distributors and key dealers who were willing to handle one specialty product alone—or one product in addition to radio.

In those days, however, there weren't so many companies in the field, and everybody from manufacturers to salesmen had less competition. Margins were greater, too. Since then competition has increased as prices have decreased.

Looked for Additional Products

And, with well-trained and highly effective sales organizations tugging at the leash, refrigeration distributors began looking for additional products which might help increase volume, build up seasonal valleys in the sales curve, spread overhead further, maintain crack house-to-house crews, and bolster dwindling profits.

Types of products most in demand as companion appliances have included room coolers, oil burners, coal stokers, electric ranges, all-electric kitchens, laundry equipment, electric sewing machines, water heaters, water softeners, and home entertainment devices.

Traffic appliances, such as lamps, irons, toasters, percolators, curlers, food mixers, and fans, have also been added with success by electric refrigeration organizations.

Distributors often believe that the addition of traffic items to a dealer's store should enlarge his opportunities for displaying and selling refrigerators to greater numbers of prospects.

Three Fields of Expansion

Conversion of electric refrigeration sales organizations into specialty appliance merchandisers shows signs of moving in three different directions.

First movement is that of taking on all the products made by one manufacturer, which is true especially of General Electric and Westinghouse franchises.

Both of these manufacturers have ultra-complete lines of electrical appliances to offer dealers. So does Apex.

Radio-refrigeration manufacturers (Grunow, Crosley, Spanton, Stewart-Warner), of course, expect most of their dealers to handle both lines.

Second movement is toward kitchen appliances and the all-electric kitchen. The latter idea appeals especially to metropolitan distributors who deal with builders and apartment house operators.

Distributors and dealers in smaller cities, too, find that while the sale of an all-electric kitchen as a unit may be difficult, there are many users of electric refrigerators to whom they can go back with a range or dishwasher and get a ready reception. Once their salesmen have learned the language of food, they discover, they can sell several kitchen appliances with almost equal facility.

Air-Conditioning and Heating Fields

Third movement is in the direction of human comfort. This, of course, implies air conditioning. It also means house heating equipment, such as oil burners and coal stokers.

For some time the Williams' plant in Bloomington, Ill., has been manufacturing both oil burners and electric refrigerators. In 1932 Kelvinator purchased the assets and good will of the Rightway oil burner company, and is now making and marketing Kelvinator oil burners.

Delco, a General Motors subsidiary and stepfather of Frigidaire, is mak-

ing an oil burner. General Electric has brought out an oil-burning furnace. Norge has begun merchandising its own oil burner.

Although all of these companies think of oil burners as production companions rather than sales companions, it does seem plausible that the two products can be sold by the same merchandising organizations—and a number of the latter are proving it.

Same Type of Selling Needed

The same types of executive management, sales management and sales training, factory representation, sales promotion, display, advertising, and retail salesmanship which are needed to sell electric refrigerators in the spring and early summer, it would appear, can be employed to sell automatic heating equipment in late summer and autumn.

Users of one device are generally prospects for the other. Average retail prices are comparable. Both go into the home, and both provide health insurance. Both are conveniences, and both are sold on the pride-of-ownership appeal.

In the past, oil burners have been sold largely through the heating and ventilating trade.

Only plumbers and steamfitters, it was argued, have seemed able to cope with the engineering problems of installing and servicing oil burners. Because such concerns have shown little aptitude for specialty selling, oil burner sales have lagged.

Improvement in Product

Recently, however, manufacturers of oil burners have simplified and improved their products considerably. Installation methods are becoming standardized.

And in almost every city there are a number of trained oil burner installation and service men who are easily and quickly available.

Furthermore, the time is coming when many electric refrigeration salesmen will have to learn the story of modern heating. For they will have air-conditioning equipment to sell; and heating is just as integral a part of complete air conditioning as is cooling.

It is significant, in this connection, to note that each year the American Society of Refrigerating Engineers and the American Society of Heating and Ventilating Engineers hold an annual convention and exhibition jointly.

Seasonal Sales

One annoyance of electric refrigerator selling is the fact that it seems to be a seasonal business. A majority of all refrigerators sold each year are claimed by buyers during the late spring and early summer.

All sorts of schemes have been tried to extend selling season into the late summer and fall and, in fact, to make it more of a year-round business. These efforts were unusually successful in 1935 when, partly because of a slow start, the industry continued doing a peak business through July and August—months which normally see the sales curve drop fast.

Extension of the selling season has been accomplished by making special inducements to salesmen, and by emphasis on the economy appeal to prospects.

Vigorously pushed contests and the offering of merchandise prizes have spurred the efforts of field sales forces; while prospects have been shown figures on actual cash savings they could make during the colder months by using an electrical refrigerator. It is also pointed out that since time payments for most refrigerators sold extend for more than a year, the purchaser must be paying for a refrigerator during at least one winter.

Service

In recent years the independent service man has been becoming more and more important in the refrigeration industry. When the business was young, the manufacturer kept a pretty tight rein on all servicing work, training his own service men and selling parts only through them.

But several factors came along to change that. Among the most important of these were (1) "orphan" machines, (2) improvements in the design of refrigeration systems, which made frequent service calls unnecessary, (3) long guarantees, and (4) a rapidly mounting increase in the number of refrigerators in use.

In the past several years, several manufacturers of household electric refrigerators either went out of business or quit making refrigerators, leaving several thousands of the machines they sold still in use. Owners of those machines needed service, and the independent service business grew and profited as a result.

Plenty of Trained Servicemen

Then, too, the policy of manufacturers in having training schools every year increased the number of trained men who were willing and

able to do service work, but who were not always satisfactorily connected. Machines have been so improved that the need for service men specially trained for one type of machine has not been nearly so great as anticipated.

Naturally, these trained service men looked around for something to do—and many of them became one-man service organizations, or joined a larger organization, where there would be more work, and more money, for them.

Longer guarantees also indirectly helped in furthering the cause of the independent service man. Owners came to expect free service, and when the dealer who sold the machine proposed to charge for service (even after the expiration of the guarantee limit) the customer was likely to become indignant and take his business to an independent service company.

While some of the manufacturers lament the existence of this trend, most of them have come to recognize its existence, and as a consequence look with a more charitable view upon the independent service station and the refrigeration and air-conditioning schools.

After making the deductions for exports to foreign countries, for stocks now in the hands of distributors and dealers, and for units which have been discarded or replaced, it is estimated that there are more than eight and one-half million refrigerators now in use in American homes and apartments.

Now it is obvious that all those electric refrigerators require a certain amount of service, and that means work for the trained refrigeration service man.

But that simple fact does not tell the whole story, because a lot of things have happened, and more developments are in process, which indicate that service men are not going to run out of work to do for a long time to come, if ever.

Large Market Potential

Obviously, the big manufacturers of electric refrigerators have not stopped selling. They expect to keep on selling a million and a half, perhaps two million units a year. They know that there are over 20 million homes in the United States which are wired for electricity and that only about one-third of these homes have been equipped up to the present time.

They also know that there is going to be a big new-home-building boom during the next few years because of the acute shortage of housing all over the country. And by the time that market is supplied, the first units sold will be getting pretty old. Then the replacement business will begin to absorb an important share of the production.

Henry Ford has been quoted as claiming that one of the chief reasons for the phenomenal success of his business enterprise has been his insistence on the dictum that obligation to the consumer does not end with the sale, but that the machine should be kept in satisfactory operation. Likewise, refrigeration executives will probably agree that following the same principle should help insure the future success of this increasingly great industry. The importance of an adequately informed and equipped service division of the refrigeration industry cannot be overemphasized.

Jobbers

Parts manufacturers have framed a definition of a jobber. This definition follows:

"The definition of a refrigeration supplies jobber or wholesaler herein-after defined does not include the type of distributor who is recognized by some manufacturers as national or territorial sales-agents. It is recommended, however, that these so-called sales-agents restrict their sales at wholesale prices to those concerns who conform to the following definition of a refrigeration supplies jobber.

"In the following definition the term 'trade' is defined as including the following:

- "1. Refrigeration Serviceman.
- "2. Refrigeration Dealer.
- "3. Refrigeration Distributor.
- "4. Refrigeration Wholesaler.
- "5. Refrigeration Contractor.
- "6. Ice Cream Manufacturer.

"The term 'Refrigeration Supplies Jobber' is defined to mean anyone performing the following functions hereinafter mentioned, and who does no retail service work for consumers, but may do service work for the trade on a wholesale basis. Provided, however, such jobber does not perform such wholesale functions merely to secure wholesale prices for the benefit of allied persons, firms, or corporations.

Functions of Jobber

"A jobber should perform the following functions:
"1. Purchase at wholesale prices at least five different essential products
(Concluded on Page 16, Column 1)

1934 Sees Dept. Stores Dropping Old Merchandising Theories in Favor of Specialty Selling Technique

(Continued from Page 13, Column 5) was no official answer, consensus of argument and facts seemed to be negative.

Other topics treated at the clinic included the worth of private brands as opposed to nationally advertised brands, number of lines to be carried in stock, number of samples or try-outs to be shown in stock, minimum mark-up on price leaders, effective control of markdowns, regulation of trade-in allowance, and percentage of stock to be carried in the prestige or upper price brackets.

One reason department stores did so well in 1934 was that manufacturers were willing and able to show them how.

Specialty Selling Necessary Step

The principles of specialty selling are basically opposed to fundamental department store merchandising theory, and at first their introduction was bitterly opposed. Finally, however, most department stores came to specialty selling as the only logical answer to the problem of moving electrical appliances in profitable volume.

The importance of department stores in electric refrigeration merchandising, far from being on the wane, will continue to increase for some years to come, was the opinion of V. J. McIntyre, manager of Kelvinator Corp.'s department store division, as given to ELECTRIC REFRIGERATION NEWS readers.

"The reason for that is clear," declares Mr. McIntyre. "When any product reaches a certain stage of public acceptance and saturation, it adapts itself readily to over-the-counter merchandising, and the department store becomes one of the most logical and important outlets for the product."

But, he pointed out, refrigeration had not yet moved into the over-the-counter class. Buyers as yet did not flock to department stores in such numbers that the average refrigeration department could do a profitable business simply by putting some stock on the floor and advertising that it was there.

Sales Must Be Worked For

Department stores which do good volume business each year have to

pull hard for it—have to find ways of pulling buyers to the department, and of closing sales that might go somewhere else without special attention.

The two ways in which a department store can do a job of refrigeration selling, Mr. McIntyre stated, are by the use of straight merchandising, where advertising and floor traffic are depended on for business, and by a combination of merchandising and specialty selling methods.

Stores using the latter plan, he added, usually showed the largest volume of sales.

Type of salesmen chosen, their training, and the supervision given them all have their bearing on sales results obtained, Mr. McIntyre observed.

He noted a further decline in the handling of special and off-brand units. Stores were learning that price alone would not sell a product like a refrigerator, which must be kept running. Ralph C. Cameron, General Electric store sales manager, told the News that it had been found that department store merchandising results in larger unit sales, because of better-trained salesmen, and that it had aided the distributor in creating considerable "plus" business estimated as high as 9 per cent.

Helps Entire Industry

"The department store resale operation, instead of taking business away from the small dealer, really helps him," insists Mr. Cameron, "since the smart merchandising tactics practiced by department stores tend to make people more electrical appliance conscious—with the result that sales climb to the benefit of all retail outlets."

There was a tendency to reduce the number of lines of refrigerators carried in 1934, since the stores experienced better sales results by concentrating on a few well-known makes.

Early in the year President Powel Crosley, Jr., of the Crosley Radio Corp., advised his distributors to conduct a resale operation through department stores, even if that operation were conducted at a loss.

Not only would such action add prestige to the Crosley name in the minds of prospects, he pointed out,

but it would also make the problem of signing up dealers in the outlying sections of that territory much easier.

Distributors who tried out his suggestion found both predictions true.

Despite longer margins demanded by department stores, distributors found it profitable to deal with them, and discovered likewise that their resale operation made money, chiefly because it was "plus" business, added volume but not bought with increased overhead.

Distributors who at first claimed that department stores would cut into their own retail operations found, in most cases, that they were crying before they were hurt.

Sales Come from Floor Traffic

Floor traffic accounted for most of the department stores' sales, and a relatively small percentage of this floor traffic was found registered on other dealers' prospect lists.

A disturbing element along the line of time payment sales, which department stores often carry at lower interest rates than the distributor could afford, was cleared up largely through local code authorities, or through the adjustment of f.o.b. prices to enable the distributor to subsidize the cost of financing his own retail operations.

With manufacturers and distributors both happy as a result of changes in department store merchandising methods during 1933, the place of these large outlets in the field seemed more secure than ever before.

Bickering Ends in 1935

A general reformation of department store merchandising practices was effected during 1935. After years of bickering between the stores and their local dealer competitors, and often between the manufacturers and the stores selling their lines, department store executives started cleaning house and reconciled themselves with other retail branches of the industry.

In January, the National Retail Dry Goods Association convention passed resolutions condemning price cutting, announced itself in favor of preserving manufacturers list prices, and discouraged "spiffs" to salesmen. Another significant step toward fair practice was taken when the convention wrote the following declaration:

"No retailer shall use advertising which lays claim to a policy of continued practice of underselling competitors."

John Wanamaker's New York store

reached a working agreement with Frigidaire and took over the company's Brooklyn retail outlets. Macy's engaged the Liberty Refrigeration Corp. to manufacture its private brand line.

But the fight was not over.

Bootlegging Continues

The biggest "bootlegging" story in the history of the industry was "broken" on March 13 by ELECTRIC REFRIGERATION NEWS after investigation of the loss of a retail franchise by a Newark, Ohio, Frigidaire dealer.

Dwight Holland, Frigidaire distributor in the Ohio city, had sold 143 units to two Columbus buyers who claimed to be purchasing electric refrigerators for distribution as prizes for a radio contest. The dealer sold the machines in good faith and, acting on their instructions, stored them in a Newark warehouse.

He soon discovered that the machines were allowed to accumulate in the warehouse, and were then transferred by truck to R. H. Macy's New York store, where they were sold at prices six per cent under the manufacturer's list prices, following Macy's famous policy. Knowing that Frigidaire would revoke his franchise for selling to an unauthorized outlet he tried to recover the refrigerators and straighten the matter out himself.

Discovery Too Late

Title to the boxes, however, had been passed from Clarence Baird, a Columbus radio dealer who had been buying Frigidaires for Macy's, to the New York department store, and Holland was unable to buy back the 143 machines he had inadvertently sold to a "refrigerator bootlegger."

Investigators from the Dayton office of Frigidaire soon located the Newark warehouse from which Macy's had been trucking the bootlegged boxes, and despite Holland's protestations of his complete innocence in the matter Frigidaire officials revoked his franchise, maintaining that warnings of the Macy bootlegging had gone out from headquarters to all dealers for several weeks.

George F. Taubeneck, editor of ELECTRIC REFRIGERATION NEWS, who conducted a one-man investigation of the case, reported that on March 8 Macy's had been selling Frigidaire Standard 3's, 4's, and Master 6's on the floor of their New York store at "6% under" prices. When Bloomingdale's, another department store, had met the \$93.50 price on a \$99.50 list price Frigidaire D3, Macy's pushed the retail price on the box down to \$87.50, \$12 under nationally advertised figures. Macy's held no Frigidaire franchise, although it did hold Leonard and Liberty franchises.

Kelvinators Also Bootlegged

A number of Kelvinators, for which Macy's held no franchise, also were being sold at greatly reduced prices, Mr. Taubeneck discovered.

In the fall of 1934, Macy's was known to have sold Frigidaire's standard "4" model, ordinarily retailing for \$116.50, for \$84.95.

All bootlegged boxes displayed on Macy's floor had been worked on so as to efface all serial numbers which might give clues to the source of supply.

Davidson's, Des Moines, Iowa, department stores, were shortly afterward found to be selling Sparton electric refrigerators bootlegged from a Chicago dealer for from \$20 to \$40 under the Sparton list prices. Other flagrant cases of bootlegging were brought to light, and an aroused manufacturing group demanded a show-down.

Agreement Finally Reached

On April 17 it was announced that Macy's and General Electric had reached an agreement whereby the department store was to sell the G-E Flatop line exclusively at a six per cent reduction, leaving Monitor Top marketing to other New York outlets. Kelvinator, Frigidaire, and Westinghouse attended the "peace conference" along with representatives of John Wanamaker, Gimbel Brothers, Bloomingdale's, Loesier's, Stern's, and the Namm stores.

With the price war ended in the \$10,000,000 New York market, the industry settled back with a sigh of relief after almost a decade of bitter controversy over department store retailing.

Notwithstanding the "scandal," department store sales boomed during the year. Ralph Cameron, department store sales manager for General Electric, told a meeting of the National Retail Dry Goods Association that sales had risen from 10 to 72 per cent among a representative group of department stores since 1934.

At General Electric's department store "merchandising clinic" held in February, 160 executives concurred in the opinion that specialty selling was definitely on the ascendant, and went on record as favoring development of

(Concluded on Page 17, Column 1)

WE HAVE BEEN TRAINING MEN FOR 20 Years!



View in Commercial Refrigeration and Air Conditioning Section of R-A-C-I Laboratory and Shops, showing students at work under direction of Laboratory Chief. Two complete air conditioning systems and many of the leading makes of commercial condensing units, with all types of boxes and display cases are in operation in this section.

Some Features of R-A-C-I Training

Complete Shop Preparatory training, including Work Sheets, Reviews, Examinations and guidance, given in student's home, covering fundamental principles and the practical applications of equipment in

Household Refrigeration
Commercial Refrigeration
Air Conditioning

Complete series of practical working Job Tickets and Engineering Data Sheets for reference.

Complete Laboratory and Shop Training, consisting of 100 hours of intensive work on equipment valued at \$35,000.00 under direction of competent instructors.

Round trip transportation from student's home to Chicago and return, included in tuition. No extras of any kind to pay.

Expert Consultation Service for students while training and for graduates when employed.

Nation wide placement service—no charge to student or employer.

Long Experience and Unusual Facilities Make R-A-C-I Training Outstanding

Back of R-A-C-I is an organization known as specialists in industrial training for two decades. It has served industry by preparing more than 100,000 competent and dependable trained technicians for jobs of many kinds. So when the Refrigeration and Air Conditioning industry found itself in need of great numbers of similar trained men, through its unparalleled growth, over just a few years, it was only natural that leading manufacturers, familiar with the work of this organization should turn to it for the men the new industry needed.

Refrigeration and Air Conditioning Institute training has been made to order for your great industry, by specialists in industrial training. Practically the entire industry has

had a hand in shaping it. Hundreds of concerns, large and small, have contributed to it. Fifty leading manufacturers have given it their official endorsement and among them they have appointed their own engineers and executives as a Board of Governors to supervise it.

The result is that R-A-C-I is now preparing men for important work in the installation, service and maintenance fields and for many application requirements—all trained exactly as the industry wants them trained.

Ambitious men looking forward to promotion and advancement in this big new field, and employers seeking men upon whom they can build for the future are invited to write for detailed information.



View of R-A-C-I Refrigeration Shop, showing students engaged in actual service, repair and test work under approved shop methods and conditions, directed by com-

petent instructors. Students have available for their use, unusually complete shop equipment, tools, and apparatus and the latest models of leading manufacturers.

Ray D. Smith, President

Refrigeration and Air Conditioning Institute ★ 2160 Lawrence Avenue ★ Chicago

Place of Servicemen & Jobbers In Industry Has Grown In Recent Years

(Concluded from Page 14, Column 5)

necessary to supply adequately the requirements of the trade.

"2. Maintain and warehouse a stock of such products to supply adequately the requirements of the trade.

"3. Distribute to the trade only a catalog, either of his own or an aggregation of his manufacturers' catalogs. In case of a catalog of his own, the manufacturer should have the privilege of editing those pages or parts of pages covering his particular products."

The business of manufacturing refrigeration parts, materials, and supplies has been recognized for some time as a definite and necessary sector of the industry circle, since the manufacturers of complete systems find it economic to purchase a great many component parts from outside specialists.

The independent service man (or company) has not been given much encouragement by the manufacturers of complete systems, but the manufacturers of parts see no reason why the independent service man should not be able to buy the supplies he needs to take care of his customers.

It is obviously impractical, however, for the manufacturer of parts to do business directly with thousands of service men scattered over the country. The service man needs quick delivery on small quantities of a great variety of items. The economic function of the local jobber becomes apparent at once.

Thus it happens that the jobbers have "recognized" the service man and set up local stocks to meet his needs. The manufacturers of parts have, in turn, "recognized" the jobber because he represents a buyer of substantial volume.

Safety Codes

Ever since 1929, when Dr. Arnold Kegel, then health commissioner of Chicago, threw the industry into a turmoil with his famous series of public hearings on a proposed code regulating the installation of household electric refrigeration equipment, engineers and public officials have been trying to produce a satisfactory refrigeration safety code.

No one will deny that the problem is bewilderingly complicated. It has been recognized from the beginning that it would be difficult to get competitive manufacturers to agree, since any kind of a code is almost sure to work out to the advantage of some manufacturers of equipment, materials, and supplies, and set up a competitive handicap to others. Whatever specifications are drawn, or whatever tests may be imposed as the yardstick for safety, the inevitable result is that somebody gets an edge in the competitive battle; and smart salesmen are quick to make use of such opportunities.

Charge of Selfish Interest's Explained

Because of this very obvious situation, the representatives of manufacturers who take a hand in the formulation of codes often hear the charge that "selfish interest" is being injected into the consideration of public safety. Yet manufacturers have learned that they cannot sit idly and permit self-appointed committees to draw up regulations, which may later be enacted into municipal ordinances, when such legislation may very effectively put the manufacturer out of business so far as that community is concerned.

Executives have simply found it necessary to look after their own interests, since adverse legislation may be just as harmful—whether it has been instigated by a scheming enemy, or is passed merely because of an over-sight on the part of an honest but tired committee.

So-called "selfish interest" is not limited to manufacturers by any means. There are numerous other conflicting forces which tend to gum up the proceedings. Most noticeable at the original Chicago hearings was the scramble for advantage by the spokesman for various trade unions, and the jealousy between departmental officials in the city hall.

With the widening of the battle front, other "interests" have been affected—including the rights and prerogatives, as well as the dignity, of various professional and trade associations. With all of this welter of divergent interest (along with a full measure of conscientious difference of opinion and experience) it is not at all surprising that someone arises occasionally at a code meeting to remind the assembly that the real purpose of the proposed code is to protect the safety of the public.

Probably the biggest stumbling block of all has been the prodigious growth of the refrigeration business, and the

progress of engineering development. Codes have actually become obsolete during the process of discussion. Most of the dangers which were foreseen a few years ago have faded into thin air. Precision manufacturing, greatly improved valves and fittings, better castings, and, in general, more efficient production, installation, and servicing—together with the enormous popularity of individual units (rather than multiple systems)—have simply eliminated most of the safety hazards.

While the prospect for the widespread use of air-conditioning equipment has given a new impetus to the demand for codes, here again new developments are continually changing the picture. The availability of Freon, for example, has practically limited the refrigerant safety hazard to one condition (an accident which would release the refrigerant into the presence of an open flame).

Refrigeration for the Farm

Whether or not the American farmer is going to invest in refrigeration equipment as extensively as it would naturally seem that he should, it is a fact that refrigeration manufacturers have sensed a demand for refrigerators that will suit the farmer's needs and pocketbook.

To give the farmer satisfactory automatic refrigeration when he has neither gas nor electric service is something of a problem. However, it is gradually being solved by utilizing liquid fuels as a source of power.

True, many modern farms have home-lighting plants, but these are almost invariably too small in capacity to handle the additional load of even a small household electric refrigerator. Placing an electric refrigerator on a farm-lighting plant usually causes trouble for both pieces of equipment, because a refrigerator can't operate satisfactorily on a varying power supply any better than the farm-lighting plant can operate when it is overloaded.

Milk Cooling Laws

Most urgent demand for farm refrigeration equipment has been from those states in which laws have been passed requiring immediate cooling of milk which is to be transported to the cities.

To serve this need, manufacturers have introduced small commercial refrigerating machines driven by gasoline engines. The gas engines may or may not be automatic (started and stopped according to commands of a refrigeration thermostat), as a farmer is generally experienced in operation of gas engines and can start the system himself, allowing the thermostat to shut it down.

For the farmer's kitchen have been developed kerosene-operated refrigerators operating on the absorption principle. Perfection Stove Co. has been furnishing a refrigerator of this type for several years, and in the spring of 1933 Gibson brought out a similar one. These are both of the intermittent type, the oil burner requiring periodic relighting.

In the spring of 1934 Electrolux announced a kerosene-burning air-cooled refrigerator, similar in design to its new air-cooled gas refrigerator with the exception of the burner mechanism and controls. This refrigerator operates on a continuous cycle.

Also suitable for farm use is Crosley's Icy-Ball, an ammonia absorption refrigerator of the dumbbell type. One of the ball elements of this unit must be heated periodically to regenerate the system, so it is not automatic. It has been quite popular with certain foreign markets, and is frequently used by exploring expeditions.

Need Large Refrigerators

Anyone who has ever eaten a meal in a genuine farm home will instantly realize that of all families the farmers would have use for household refrigeration more than any other group. Nobody eats any better meals than farmers, as a class, and perhaps not even the day laborers depend so much on healthful, untainted food to "keep them going" in the pursuit of their livelihood.

Farm families are generally big families (particularly if you count in a hired man or two), and each member of the family is sure to be a hearty eater. No four or five cubic foot refrigerator will satisfy their needs. Only the very largest sizes will do.

Moreover, the refrigeration salesman who raps at the farmer's door generally finds himself in virgin territory. In this case it is not a question of replacing another type of refrigeration. The ice man usually doesn't get out that far. For the farmer it's either mechanical refrigeration or none at all (if one doesn't count the

cellar and the "spring house"—and no salesman worth his salt would consider these makeshifts as providing refrigeration).

To farmers who live along the routes of power lines the answer is simple: install an electric refrigerator. But the majority of farm homes are not served by electricity. In these homes, then, the oil-burning and the gasoline-driven refrigerators should have almost immediate acceptance.

Market for Various Types

Household refrigeration, of course, is not the only type of equipment which can be sold to farmers. Milk cooling has long been one of the most profitable segments of the commercial refrigeration business. To the dairy farmer an adequate milk-cooling plant is almost a necessity—and is required by law (if strictly interpreted by the examiners) in a great many states. Installations for cooling dairy products generally run into considerable money, too, and some concerns have actually made the sale of this type of equipment the mainstay of their business.

Truck and poultry farmers also need adequate refrigeration facilities.

To date the rural market has been sadly neglected by refrigeration sales organizations. The pickings were (comparatively) too easy in the metropolitan areas. Selling to farmers is slower business, requires a different approach and technique, and has a relatively high sales cost. Moreover, most distributors and dealers have been stopped by the fact that so many farms are not served by power lines. Even today there are but a few makers of non-electric mechanical refrigerators on the market.

Those who have been able to obtain franchises for these oil-burning or gasoline-driven refrigerators, however, will in all likelihood cash in on the opportunity that awaits them.

Water Coolers

Most of the leading manufacturers of electric refrigeration equipment include water coolers in their line of products. These may be individual units of either bottle or pressure type, or they may be multiple water-cooling systems with the refrigerating machine in the basement.

Office buildings, factories, restaurants, clubs, hotels, shops, recreation halls, and many other places are excellent prospects for water coolers. Sales have been good in this division.

One adaptation of the water cooler is the vending machine for refrigerated drinks. These may be had in both pressure or bottle types, regulated by a coin device. Although a number of refrigerated drink vendors are now in service, and although a few packaged ice cream vending machines using electric refrigeration have been made, progress on refrigerated vending machines has been relatively slow.

Gas Refrigeration

A strong competitor of the electric refrigerator for the household market in some sections has been the gas-operated absorption-type refrigerator. These refrigerators are sold almost entirely through gas utility companies, which act both as distributors and dealers. Sales to apartment houses in a few large cities have been especially good.

Because gas is available only in certain sections of the country, gas refrigerators are not distributed nationally. New York City has been the most thoroughly cultivated market. Varying gas and water conditions in different cities have provided some obstacles for this type of refrigerator to surmount.

The Electrolux gas refrigerator, made on Swedish patents by Servel, Inc. (which also manufactures Servel refrigeration equipment), has been practically the only one in the field. It has been on the market since 1927.

First direct competitor of Electrolux was announced in January, 1932, but did not become a factor in the business. This gas refrigerator was the Faraday, manufactured by the General Motors Corp. in the Frigid-Aire Plants at Dayton. For the present, at least, Faraday manufacturing operations have been suspended.

Unlike Electrolux, Faraday gas refrigerators utilize a solid absorbent, run on an intermittent cycle, and allow remote installations.

Large Electrolux Sales in New York

Until the last couple of years gas refrigeration sales have largely been confined to the city of New York, where the Consolidated Gas Co. has been selling thousands upon thousands of Electrolux gas refrigerators for the last several years.

Electrolux production is said to be approximately one-tenth of the mechanical refrigeration industry's total each year.

Up until 1932, very few Electrolux dealers outside of New York City were in the picture. On the Electrolux roster now, however, are about

30 gas utilities (nobody else can sell Electrolux) which are said to be doing a business equivalent to that of the average electric refrigerator distributor.

Solid CO-2

In the past few years, solid carbon dioxide has advanced from a lecture table curiosity to an important branch of the commercial refrigeration industry, and has become the subject of considerable experimentation with a view toward use in household refrigeration.

During the course of its commercial development, lively discussions were held, particularly in technical meetings, by its protagonists and antagonists. Its enthusiasts insisted that it possessed great possibilities, while makers of other types of equipment foresaw several problems affecting its application which, they argued, would materially retard its invasion of the field. Probably both groups were right.

Industry Application Practical

Extensive application of solid CO₂ to numerous scattered industrial operations has been found practical. It is used for securing extremely low temperatures in treating duralumin rivets for airplanes, hardening bony shellac for shipment, shipping and cooling of serums, testing steel rails, shrinking metals, in the manufacture of vacuum tubes, and to preserve wood, fur, grain, etc.

More important from the standpoint of quantities consumed are its applications in refrigerated trucks, ice cream cabinets, display cases, and the freezing of fruit juices. Experiments are also being made with CO₂ household refrigerators.

It is also true that engineering problems affecting the development of solid CO₂ were real and difficult, and have been obstacles to more rapid growth of the industry. However, they are being solved, and it now appears that further use of the refrigerant depends (like the whole commercial refrigeration market) more on the financial ability of the purchaser to buy new equipment.

Problems of Control

One of the important problems was that of designing equipment in which consumption of the solid CO₂ and temperatures in the storage space could be properly controlled.

The refrigerant tended to sublimate much too fast, due to the wide differential between its temperature of -109.3° F. and normal temperature refrigeration. Likewise, rising temperatures in the food compartment were apt to result following the disappearance of the refrigerant.

Designers have found that the use of a secondary cooling medium, such as alcohol or a volatile refrigerant, permits effective control. In one design, for instance, alcohol is circulated between a solid CO₂ compartment and the storage space, control being accomplished by a manually or thermostatically operated valve in the alcohol line.

Use with Methyl Chloride

Another control system condenses methyl chloride in the solid CO₂ chamber, and allows the liquid methyl to flow by gravity into the storage compartment, where it evaporates to cool the truck body and returns via a thermostatically controlled valve to the condensing chamber.

Insulating equipment for the low temperatures of solid CO₂ was another problem. Not only was greater insulation needed to accommodate the greater temperature differential, but increased precautions were necessary against the moisture which tended to accumulate because of the lower temperatures.

A major problem in the early development of solid CO₂ refrigerant was its distribution. Well-insulated motor trucks and freight cars have now been designed which allow shipment of the refrigerant over considerable distances.

New solid CO₂ producing plants have sprung up frequently encouraged by the fact that they had a large free supply of CO₂ gas available as an otherwise-wasted by-product of other industrial processes.

These plants have extended and facilitated distribution by utilizing insulated warehouses, so that solid CO₂ can now be produced in practically every city of any size in the country.

Larger Production Brings Price Down

Prices have come down rapidly with economies resultant from the operation of larger production units, until solid carbon dioxide can now be purchased at surprisingly low figures—depending, of course, upon quantities ordered.

The term "dry ice" incidentally, may be used by any producer of CO₂, since the U. S. Supreme Court ruled in May, 1935, in an appeal case, that the term is descriptive and could not be registered as a trade-mark by the

DryIce Corp. of America. Although admitting its public acceptance, other manufacturers have shown little tendency to adopt the term because they do not care to follow in the train of the company which coined it.

The future of solid CO₂ in household refrigeration is an open question. Two such refrigerators have been exhibited and appear to be quite economical in their consumption of the refrigerant.

Makers of household electric refrigerators do not seem to be alarmed, however, for they feel that the servicing requirements (periodical charges) of solid CO₂ will hinder its popularity among housewives.

Ice and Ice Boxes

Notwithstanding the increasing sale of electric refrigerators, the ice business has apparently lost comparatively little ground. In 1930 it had one of the best years of its long history. The strong advertising programs and intensive selling efforts of the electric refrigeration industry have undoubtedly made the public more "refrigeration conscious," and have thus helped boost the sales of ice.

Commercial uses for ice are increasing. The industry is especially interested right now in the development of equipment to utilize ice for comfort cooling in homes and commercial buildings.

Ice Industry Renews Activity

Moreover, the ice refrigerator business has had a rebirth, and competition from this source is threatening to cut into the annual total of unit sales of household electric refrigerators.

Dealers have noticed this renewed activity, and many of them are wondering what to do about it. Prospects are beginning to ask them pertinent—and impertinent—questions about dehydration of foods, annual operating costs, cabinet odors, and other points which obviously have been brought up by ice men.

That operating a good refrigerator is demonstrably cheaper than using ice, that dehydration of foods is no longer a problem, and that cabinet sanitation is fully as simple with electric refrigeration as with ice, are arguments that are really beside the point—which is that these questions are being raised.

The attack by the ice interests is coming from two directions: (1) organized ice refrigeration bureaus in various cities, and (2) stylish, soundly constructed ice refrigerators (not boxes) which hold satisfactory temperatures and use comparatively small quantities of ice.

These ice promotion bureaus aggressively advertise ice refrigeration in newspapers and by throw-aways as being the best form of refrigeration. Some of this promotion sticks to the story of ice as a refrigerant, without bringing up the subject of electric refrigeration. A few misguided bureaus, however, make a direct frontal attack on electric refrigeration, drawing comparisons which are frequently unfair, making rash and unjustified statements, and assuming an altogether belligerent attitude.

But while this ice bureau promotion may be annoying, it is not nearly so serious a competitive item as the modern ice refrigerator. In the earlier days of the electric refrigeration industry the difference between ice boxes and electric refrigerators was so great that there was really no comparison. Today, however, the ice refrigerator of the better type is a job no member of the electric refrigeration industry can hold in contempt. It has beauty of appearance, is constructed of excellent materials, makes ice cubes, and is equipped with a variety of gadgets for the convenience of the housewife.

Although these ice refrigerators are priced much higher than old-fashioned ice boxes, there is generally enough difference between one and an electric refrigerator to make the prospect stop and think about it awhile. Moreover, ice companies are pushing hard their claim that is costs less to use modern ice refrigeration than electric.

Ice Boxes Undergo Improvement

This is a far cry from the kind of ice competition the industry used to face. A few years ago ice boxes were constructed as cheaply as possible insulated with "Michigan air," had homely wooden exteriors, burnt up ice voraciously, and did not really give refrigeration. Ice plants were in sympathy with the production of these cheap boxes, for they used lots of ice. The coming of the electric refrigerator, however, has changed all that. At first the ice industry pooh-poohed its new rival, then it went in for large-scale hating, and at last it has done something about the situation.

Unofficial but reliable reports indicate that considerably more than 100,000 modern ice refrigerators were sold in each of the last two years—practically equivalent to the number of gas refrigerators merchandised during the same period.

Coinmeters Help Bridge Depression, But Dept. Stores Look to Specialty Selling for Future Sales Records

(Concluded from Page 15, Column 5) resale operations and cooperative tie-ups with local utilities to push electric refrigeration sales. J. A. Hall, FEA representative, pointed to an immediate market for electrical appliances under the federal loan plan, much of which he said could be secured by department stores.

D. F. Kelley told a June meeting of the national department store organization in Chicago that their sales could be doubled by intensive promotion of major lines, specialty selling, and establishment of trade-in departments with intelligently developed resale operations. Credit managers at the meeting viewed electric refrigerators as the best long-term payment bet under their jurisdiction.

Frigidaire Relaxes Control

Frigidaire's old-as-the-industry plan of strict control over retail outlets was relaxed somewhat with the discontinuance of several outlets whose franchises were turned over to department stores. Rex Cole, leading General Electric distributor, abandoned his extensive New York show rooms to move into smaller quarters. Mr. Cole said that his organization no longer needed elaborate displays—the public was sold on the idea, and retailing had become more a matter of meeting delivery schedules than of demonstrating. Department stores hence were to assume a larger role in his show.

Private Brands Scare Again

Fear of private brand trouble broke out midway through the year as department stores and manufacturers alike watched the expansion to new highs of the Sears Roebuck and Montgomery Ward retail store business. The two mail-order houses sold 100,000 private brand units between them in 1934, and manufacturers commenced to receive requests from frightened department stores for shipment of "nameless" machines from the factories at higher discounts to meet the invasion of the market on the same terms. Business was so good for all dealers during the year, however, that the scare subsided.

Coinmeters, which were introduced into the industry as time payment selling aids in 1931, were pushed by Frigidaire, Kelvinator, and Leonard through department store outlets during 1935.

Coinmeter Plans

To reach the lowest income brackets, coinmeters using the quarter-a-day and even 15-cents-a-day plans had boxes delivered to customers' homes on the time payment plan. Notable among these was the Len-A-Meter, which collected a quarter a day.

Some department store executives reported considerable increases in sales on the coinmeter principle, but other retail branches of the business were opposed to the plan because of the long-term financing necessary to complete payments, the tendency of customers to use their boxes only intermittently and thus prolong the payment process still further, and the necessity of making too many resessions.

Utilities Frown on Coinmeter

Utilities, in particular, were opposed to the coinmeter as a sales device, and specialty salesman scoffed at the plan as a "sissy" idea.

Most coinmeters operated on the principle of the customer depositing a quarter each day, which provided current for the 24-hour period and paid a varying amount on the retail price of the refrigerator. Others were simply current-payment collectors with a separate rental on the box. Most department stores adopted the coinmeter plan without demanding a deposit on the machine.

Although still used by many department stores and a few utilities, the coinmeter has been frowned upon by most executives in the industry and by not a few department store managers.

Flyweight schemes periodically recurred in department store sales promotion. Jones, large Kansas City store, skyrocketed their business by paying each buyer of a \$159.50 machine a \$15 bonus to cover current used by the machine over a year's time.

Outside Selling Needed

D. Harrison Paris, manager of Rosensbaum's, Pittsburgh, strongly advised department store sales managers to push outside selling, both as a promotion factor and as a means for developing good will toward their stores through sales of a satisfactory, dependable product.

The year closed on an optimistic note for department stores, with average sales gains for individual stores reported as close to 20 per cent.

The last reverberations of bootlegging by department stores were heard

early in March of this year when Rackcliffe Brothers, New Britain, Conn., Kelvinator distributors, filed suit for \$5,000 damages against the Mayflower Sales Corp., of Hartford. During the trial, it was revealed that Rackcliffe's sold 166 machines in a two-carload lot to this sales organization, who had claimed that they were to be used in apartment house installations in New Haven.

The machines were later discovered on the floor at Macy's New York store selling at the usual markdown prices. Kelvinator officials bought up 163 of the boxes for prices ranging from \$16 to \$22 above distributor's list prices, and gave Rackcliffe's the alternative of paying the aggregate bill of \$3,276.11 or losing their Kelvinator franchise. Rackcliffe Bros. paid this sum. The court awarded damages of \$3,366.09 to the New Britain firm in their action against the Mayflower Sales Corp. in May.

Demonstration 1936 Keynote

Demonstration has been the keynote of 1936 department store sales appeal to date. Stores have been forced to "show what the refrigerator will do" to close customer deals. Specialty selling, and many such sales crews are now as conversant with the fine points of their boxes as are those of "regular" specialty dealer organizations.

The 1936 convention of the National Retail Dry Goods Association predicted a boom in appliance sales this year, and according to reports to date the prediction has been largely fulfilled.

Executives of these big mercantile establishments declared that electric refrigerators are the most popular appliances sold by their staffs. Eighty-nine per cent of the country's department stores reported that they carried major lines of boxes. In 62% of these stores electric refrigerators were "best sellers."

After hearing reports from 1,649 out of 2,250 department stores questioned, the General Electric merchandising clinic concluded that trade-ins were being carried by most stores as total losses. The conclave requested manufacturers to establish definite trade-in values and to set up a system of advertising control on trade-in allowances.

Its executives also demanded larger discounts to aid them in raising their profits in view of the trade-in situation. (History repeats itself).

Strawbridge and Clothier, Philadelphia department store, reported having put trade-ins on a paying basis in connection with their sales of new G-E machines.

Today's Problems

The main problems in department store merchandising today seems to be the development of intensive specialty selling, and overcoming price demands on the part of customers who are accustomed to "get it for less" at a department store.

Service, partly due to long-term service and replacement guarantees, and partly because of the efficiency of independent service companies, has ceased to bother most managers. Rapid turnover—the basis of department store success in the past—is still a question mark.

That the department stores are fully satisfied with refrigeration as a business, however, seems to be indicated from late reports of booming sales and larger orders.

Wall-Whalen Handles Norge in Richmond

RICHMOND, Va.—Appointment of Wall-Whalen Co., a new firm, as dealer for the complete line of Norge appliances was announced by Benjamin T. Crump Co., distributor, at the formal opening of the new dealership here a fortnight ago.

Russell M. Whalen, formerly with Chesapeake & Potomac Telephone Co., is president of the company; F. Gresham Wall, formerly with Wortendyke Tissue Co., is vice president and general manager, and Kyle Walker is sales manager.

Utilities Capitalize on Double Profit-Building Possibilities In Selling Refrigeration

It isn't often that a business gets the opportunity to sell a horse and then enjoy riding behind it—but the nation's public utility companies have been so fortunate in their relations with electric refrigeration that the foregoing has been exactly the situation they have enjoyed. They have sold thousands upon thousands of electric refrigerators which, in turn, have added to public utility profits by increasing the consumption of electricity.

Many utilities were lifted out of the doldrums of the depression years through their electric refrigeration departments, and the business has been profitable both to the industry and the utilities which are one of its many backbones.

In 1926, when the electric refrigeration industry was awakening to its own potentialities, and the public was peeking awe-struck into the strange new product that made ice cubes through the machinations of a tiny motor or the still stranger work of a gas flame, public utility executives saw some interesting hand-writing on the wall of electrical progress.

"Load building!" Why, here was an opportunity almost to double household current consumption on electric light lines, and there was nothing to prevent utilities from selling the remarkable device which would lead them out of the wilderness!

Awakening in 1926

It should be noted that utility engineers had long been aware of the existence of small refrigerating machines for household use. But not until 1926 did they consider that the development of these machines had been sufficiently advanced for the utilities to place their stamp of approval on them, and go out to pioneer their use.

The September, 1926, report of the Committee on Domestic Refrigeration,

Metropolitan New York Section, National Electric Light Corp., struck the keynote:

"In discussing the electric refrigerator, it is well to recognize the significant effect it will have on the electrical industry. The electric refrigerator will at least double the average residential bill for electricity. The addition of \$30 to \$50 annually to the bill of the residential customer will have a most important effect on the Central Station industry as a whole."

Old Load-Builders to Background

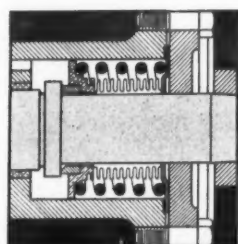
Carefully, but nevertheless enthusiastically, conventional appliances such as toasters and coffee percolators were segregated into the show window backgrounds in utility buildings, and gleaming white electric refrigerators surrounded by all sorts of background displays were unveiled to the public. The new article did not belie its load-building promises, despite its comparative economy of operation.

Electric refrigerators, of course, had been in existence and working for several years, but they were mainly confined to wealthy homes. Saturation of the wired-home market was infinitesimal—between 1 and 2%. The field had been open and waiting for some years, but not until the Waldenwoods meeting of manufacturers in September, 1926, did the electric refrigeration Rip Van Winkle

(Continued on Page 18, Column 1)

BRUNNER'S "BALANCED SEAL" IS Leak Insurance

The diagram to the right shows, in blue print style, how Brunner engineering prevents leaks at one of the most vital points in mechanical refrigeration: where the crankshaft inserts into the crankcase. A unique, accordion-like sealing device is



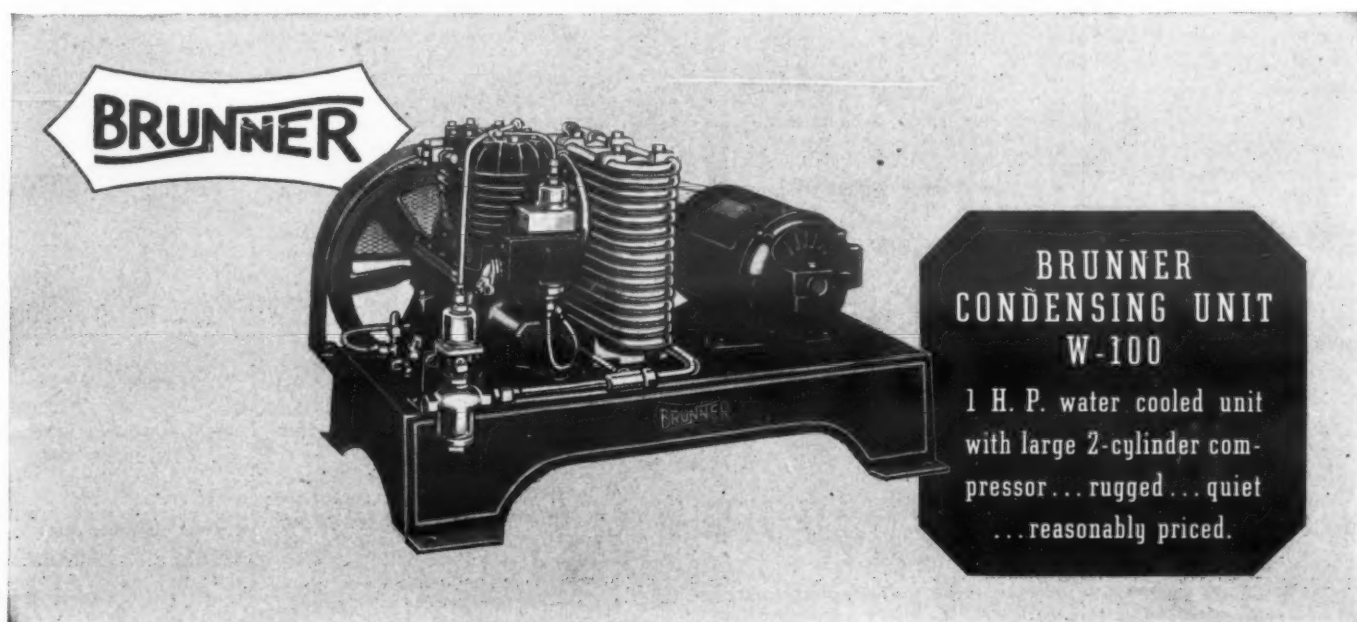
so designed that a constant pressure is exerted on the seal nose regardless of the crankcase pressure. Leakage is positively prevented, no matter if the inside pressure is greater or less than

atmospheric pressure. Think of this advantage in terms of safety and economy! Get the full mechanical details of Brunner's "Balanced Seal" and companion features. See why Brunner is "The Fastest Growing Name in the Industry". Brunner

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BRUNNER CONDENSING UNITS and COMPRESSORS

Utilities' Price Cutting Tactics to 1931 Lead Refrigeration Dealers to Fight For Ban on Utility Merchandising

(Continued from Page 17, Column 5)
arouse from his 20-year incubatory slumbers.

Soon New York Edison, Public Service of New Jersey, Georgia Power, and Toledo Edison were in the field with expanding sales organizations, and promoting public acceptance of the new product. Georgia Power reported \$155,000 sales in a six-weeks' selling campaign during the fall of 1926, and in February, 1927, Toledo Edison claimed a world sales record for a single month by selling 560 units.

Utilities Cautious at First

Despite industry and customer enthusiasm, however, many utilities were cautious. Unlike some independent dealers, they could not fold their tents and steal away in the night if the new product proved a "dud." They were risking a bit of their reputations for public service on the performance of a new product which had burst into view on the sales horizon so quickly that it had sales organizations running in circles trying to get organized.

The fall of 1926 and the spring of 1927 were spent by most utilities in developing and training adequate sales forces to exploit the field. Service departments had to be organized from the ranks of their own trouble shooters. Utilities, for the most part, avoided the department store error of stocking "jillopies," and relied on established makes to build their reputations with customers. Even with some of these "established" brands they had their troubles.

An early 1927 survey conducted by ELECTRIC REFRIGERATION NEWS showed utility executives uniformly enthusiastic about the future of the field, confident in the reliability of equipment, and having faith in their abilities to solve service problems.

Whose Burden Is Service?

Free service was an early bone of contention. Customers clamored and service men perspired in the early days, and the cost of answering and servicing all calls was considerable. Most public utility heads concurred in the opinion that too much profit was thrown back into servicing, and determined to place the burden on the manufacturer.

Early in February, 1928, the Electric Refrigeration Council of the N.E.L.A. exercised the first concerted

sales action by utilities in launching a campaign to sell 500,000 units that year through well-planned direct mail and advertising promotion. Believing that 10% of the country's wired homes were immediate prospects, they determined to sell the idea of electric refrigeration. G. B. Richardson was named chairman of the committee.

Shortly afterward, central station executives set \$30 as a reasonable amount to expend in promoting the load building potentialities of each unit sale.

Sales contests staged by various utilities all went "over the top" by wide margins in the summer of 1928. Georgia Power, the perennial quota-buster, sold \$641,000 worth of General Electric units in 53 working days.

So invariably successful were the efforts of this utility's merchandising department, then directed by H. E. Pendergast, that editors of the News kept in type a standing headline:

**GEORGIA POWER CO.
GOES OVER THE TOP
IN SALES CAMPAIGN**

Gas utilities were entering the field with the Electrolux absorption type machine, and N. T. Sellman of Consolidated Gas of New York reported the sale of 18,354 units as of July 1.

Average Consumer Use Rises

The Washington, D. C., Gas Light Co. cited the case of an apartment house which, before gas refrigerators were installed in its 100 apartments, was costing the gas company money to keep the lines serviced. After the installation, the average monthly gas bill in the building jumped from \$1 to \$2.50, and the connection became more than profitable.

Statisticians who reported in 1926 that the electric refrigeration share of the consumer's electrical dollar was a fraction of a cent, now reported a substantial average gain. Detroit Edison described a load curve showing an increase in kilowatt-hour consumption from 319 per customer in 1917 to 570 in 1928, the average mainly due to power consumed by electric refrigerators.

Utilities were doing their merchandising job so thoroughly, however, that an undercurrent of criticism and resentment was provoked in the ranks of dealers and distributors.

M & E Fights Utility

In April, 1929, Merchant & Evans, Philadelphia manufacturer, sought an injunction from the Federal Trade

Commission against the Philadelphia Power Co. to enjoin the utility from merchandising all electrical appliances, including electric refrigerators. The move was considered an expression of the *vox populi* of hundreds of retailers, but was dismissed in June by a superior court ruling.

The 1929 convention of the N.E.L.A. reported electric refrigerators to have doubled the domestic current load in most sections of the country, and predicted that 650,000 machines would be added to utilities' power lines before the year ended.

News Warns Utilities

"Price cutting," the 1929 war cry of the independent retailers against department stores, was now being directed against public utilities, and ELECTRIC REFRIGERATION NEWS warned the utilities editorially that price cutting, whether in the form of discounts, longer terms on payments, trade-in allowances, or other special concessions not offered by the retailers was a venture into dangerous territory.

A "Declaration of General Merchandising Principles" was issued soon thereafter by the N.E.L.A., announcing that public utilities would segregate the accounting of their merchandising and promotion departments, and all expenses would be properly charged to the right departments. Merchandising departments should pay their own way, it was declared—a statement with which independent dealers heartily concurred.

In June, N.E.L.A. launched a National Food Preservation Program through a council organized within the group, setting "50 Degrees Is the Danger Line" as a sales promotion criterion. Almost at once, the water ice industry countered with contrary statements, and in some cases, with derogatory pamphlets issued by ice men to consumers in large cities.

Georgia Power Again

Other significant events of the year were Georgia Power's first million-dollar sales drive, successfully completed in 52 days, and a statement from M. S. Sloan, president of New York Edison, that his company would not cut list prices or exercise unfair competition in entering the field with an intensive sales program.

Utilities reports for the first quarter of 1930 showed that electric refrigerators were first in sales volume and amount of combined income, and fourth in the amount of actual load revenue.

The growing policy of retrenchment caused by public and competitive pressure was illustrated by the action of the Central Hudson Gas & Electric Co., Poughkeepsie, N. Y., in withdrawing from active retail merchandising and surrendering Frigidaire franchises to independent dealers. The power company was of material aid in helping the new retailers to set up and step up their sales organizations.

Add Companion Merchandise

Several companies tried to rebuild or add to their sales volumes by using the companion merchandise theory, coupling electric stoves, oil burners, or some other load building appliance to their electric refrigerator lines.

As the year closed, a nation-wide utility survey showed that the wired-home market for electric refrigerators along their power lines was 13.4% saturated, which, leaders said, demonstrated the advisability of centering 1931 plans on electric refrigerator sales.

An important chapter in the history of 1931 is concerned with the fight waged by associations of department stores, hardware dealers, furniture dealers, and others against the merchandising of appliances, including electric refrigerators, by public utilities.

Certain groups of distributors and dealers had manifested discontent for some time with the alleged price-cutting tendencies of competing central station outlets, but the industry as a whole was astonished to read on the first page of the March 25 issue of ELECTRIC REFRIGERATION NEWS that the state legislatures of Oklahoma and Kansas had banned the merchandising of electrical appliances by public utilities.

Oklahoma Ends Utility Sales

The Oklahoma bill, signed by Governor "Alfalfa Bill" Murray on March 19, was passed after an influential group of hardware and furniture dealers of the state had appeared before a legislative committee studying the situation. It was passed by the senate on March 3 and by the house March 10.

In substance, the Oklahoma measure ordered state utilities to confine themselves to selling electrical current to the public and desist from the merchandising of electrical appliances after June 17, under penalty of a fine ranging between \$100 and \$1,000 imposed on "any officer, director, manager, agent, or employee," or one day to one year in jail. The act allowed the central stations to sell all their merchandise on hand and repurchases made for the purpose of collecting the purchase price.

In the same issue of the News was reported the passage of a Kansas anti-merchandising bill which forbade central stations to manufacture or sell electrical appliances after Aug. 1.

On March 17, the Nevada state senate killed a proposed bill prohibiting public utilities from selling household appliances after it had passed a house vote. The measure was aimed particularly at the merchandising activities of the Sierra Pacific Power Co., which serves a large section of Nevada.

On the same date, a similar bill was introduced in the Illinois legislature and was referred to a committee.

Representatives of hardware and furniture dealers' associations were reported encamped at Jefferson City, Mo., to help support the Maxey bill, an anti-utilities act, which had already passed the Missouri house and was being studied by the state senate.

California Also in Fight

At the same time, it was ascertained that a bill proposing abolition of public utility merchandising had been introduced in the California legislature in February, backed by independent appliance dealers who complained of price-cutting by central stations. Another had been introduced in the Nebraska legislature.

Commenting editorially on the situation, the News stated that there was no justifiable excuse for price-cutting by utilities, and that they would find it to their best interests to further the work of enterprising independent retailers, but that too often in the past public utilities had been made the scapegoat without justification by political combines seeking to smash them.

J. F. Owens, N.E.L.A. vice president and general manager of the Oklahoma Gas & Electric Co., stated the case of the utilities in an article written especially for the News in which he defended their appliance sales on the basis of the superior facilities for public service by the central stations.

Matthew S. Sloan, president of the New York Edison Co., told a News reporter that "all this is politics," and averred that the attack on utility merchandising was simply another outburst of the old politically-backed quarrel between anti-trust factions and the central stations.

Fight Dies Down

In the April 8 issue of the News, it was reported that a California state senate committee had refused to report back the anti-merchandising bill by a vote of six to three, and that the Nebraska legislature had defeated the bill proposed to it. Rural legislators were reported solidly behind the Nebraska measure, backed by retail trade associations.

A bill of this nature which had passed the Indiana state senate was killed by a house vote the same week.

In Pennsylvania, an anti-merchandising bill was proposed in the state house which also would have forbidden public utilities to bill consumers on a monthly basis for purchases of merchandise.

By April 22, the Missouri measure was killed in a state senate committee. Another bill was reported being considered by the Texas legislature. Soon similar measures were being considered in the legislatures of Tennessee, Alabama, and Wisconsin. Almost as suddenly as it had arisen, the fight died down, and bills were killed in all states but the two which had originally banned public utility merchandising—Oklahoma and Kansas.

A joint committee of the N.E.L.A. and the National Retail Dry Goods Association studied the situation, and at the N.E.L.A. convention in June, impassioned speeches were delivered calling upon the utilities to arise and do battle against governmental interference.

Utilities Fear Regulation

Manufacturers ostensibly kept out of the conflict, although they did all they could to quiet unrest in the ranks of their dealers. Most of the larger manufacturers listed many public utilities among their best outlets.

ELECTRIC REFRIGERATION NEWS was the first to get and print news of the struggle, presenting complete stories of legislative action in all states well in advance of electrical and public utility trade magazines.

Central stations played a minor role in the electric refrigeration merchandising drama in 1932 for the first time since the industry made its debut. One reason was fear of regulatory legislation.

They were impressed by the fact that the bills to prohibit public utility merchandising were introduced in a number of state legislatures almost simultaneously in the spring of 1931. The campaign, led in each state by associations of retail merchants, seemed too well-timed and coordinated to have happened accidentally.

Lose Ground in 1933

For the most part, purchases of electric refrigerators by power companies in 1932 were of the hand-to-mouth variety.

Parenthetically, it might be noted that appliance sales were said to have fallen off badly in Oklahoma and Kansas since those states legislated against public utility merchandising; also that newspapers in those states, missing central station advertising, campaigned for a repeal of the prohibitory statutes.

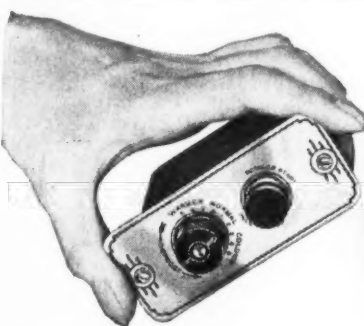
Utilities, which formerly had accounted for the biggest share of the industry's distribution, continued to lose ground in 1933—although they were still a highly important factor.

That they would be increasingly important in appliance selling in 1934, however, seemed indicated by the problems and struggles they encountered in 1933.

Roosevelt Raps Utilities

For 1933 was not an easy year in the power and light business. President Roosevelt began rapping utility practices in his campaign speeches in 1932. Investigation by the Federal Trade Commission had focussed public attention upon so-called "flaws" in the industry. Taxes were raised dur-

(Continued on Page 19, Column 1)



CUTLER-HAMMER REFRIGERATION CONTROL

For Replacement Service

The dependable C-H Refrigerator Control is now available as a replacement unit. Same control used on popular-make Refrigerators . . . proved by time and service . . . manufactured by the Pioneer Control Company with 50 years of experience.

Easy to install, has the features which bring large-volume replacement business. Keep four models on hand and you are ready for 99% of all domestic calls. Each model mounts horizontally or vertically, fits large or small evaporator-shield openings. Simple connections get job done in a hurry.

NEW MODERN FEATURES. Differential adjustment screw gives whatever cut-in and cut-out temperatures or pressures are wanted; cold-control knob adjusts temperature or pressure range; defrost position; full overload protection to motor, resetting from self-indicating start-stop button. Handsome modern indicator plate in shiny chromium and black.

See your jobber at once. Send for complete new catalog describing this modern replacement control. Also replacement control for beverage coolers, ice cream cabinets and commercial service. Send for the catalog today. CUTLER-HAMMER, Inc., Pioneer Manufacturers of Electric Control Apparatus, 1362 St. Paul Avenue, Milwaukee, Wisconsin.



4 models meet 99% of all domestic calls. Temperature type in 24" and 48" tubes. Pressure type for sulphur dioxide and methyl chloride systems.



Mounts Horizontally or Vertically. Installs easily.

FOR BEVERAGE COOLERS AND ICE CREAM CABINETS

C-H Replacement Control for commercial use offers same big advantages as domestic controls. See catalog for full description.

CUTLER-HAMMER
REFRIGERATION CONTROL FOR REPLACEMENT SERVICE

Class 9100 Regulators With MANUAL CUT-IN LEVER



Lever raised vertically to lock contacts closed.

To close contacts lever is pressed down.

The special external manual cut-in lever, pictured, is available in all 9100 Regulator types, whether pressure or temperature, with or without overload protection and high pressure cutout.

The function of the lever is to allow starting of the refrigerating cycle in advance of its normal automatic cut-in point. If desired, the control contacts may be locked in to assure continuous duty, but locking in does not prohibit the operation of the overload mechanism or high pressure safety cutout.

Write for booklet covering The 9100 Line.

Export Dept., Regulator Division, H. M. Robins Company,
120 Madison Ave., Detroit, Mich., U. S. A.

SQUARE D EVERYWHERE
SQUARE D COMPANY
REGULATOR DIVISION, DETROIT, MICHIGAN
WESTERN DIVISION, LOS ANGELES, CALIFORNIA
SQUARE D COMPANY, CANADA LTD., TORONTO, ONTARIO

Government Entry into Power & Retailing Fields in 1934 Worries Tennessee Valley Utilities and Appliance Dealers

(Continued from Page 18, Column 5)

ing the last year to the point where, in June, it was estimated that 27½ cents out of every dollar earned by gas and electric companies, in relation to operating income, was absorbed by taxation.

Transfer of the tax on electricity used for domestic and commercial purposes from the consumer to the privately owned utilities was part of a House bill which passed the Senate in a revised form May 12.

Coincident with the tax problem, pressing demands for rate cuts were being made throughout the country; and many such cuts, voluntary and involuntary, were made.

Los Angeles Gas & Electric was forced by a United States Supreme Court order to reduce its rates in May; Southern Utah Power Co. made a reduction at about the same time. Commonwealth Edison Co. promised its consumers a rate cut early in the year, and New Yorkers began demanding lower schedules from their utilities.

Michigan, Kentucky, and Alabama were other states to feel the pressure for lowered rates in the spring of the year. And similar reductions and agitation for reductions went on all year.

Last announcement of a rate cut in 1933 came from Georgia Power Co.

TVA Enters Field

Perhaps the biggest utility news of 1934 was the entry of the United States Government — through the Tennessee Valley Authority — into the business of merchandising electrical appliances. Through the medium of the Electric Home & Farm Authority, TVA offered to finance (at low terms) the sale of low-priced electrical appliances, so that a load might be built on electrical power transmission lines leading from Muscle Shoals and other government ventures into the power business.

Demand of the government for lower prices, with the resultant decrease in margins for distributors and dealers, and the aggressive merchandising of these appliances by public utilities all combined to play hob with the refrigeration business in that territory.

Dealer protests were not long in arising. Ten Atlanta, Ga., dealers in mid-May secured a temporary injunction, which later was dissolved in federal court, against the Georgia Power Co.'s sale of TVA appliances, charging that the sale was harming their business.

Dealers Battle TVA

A short time later, attorneys for other Georgia and Alabama dealers sent appeals to President Roosevelt to halt the sale of TVA appliances in their territories, charging it was an attempt to place the sale of electrical appliances directly in the hands of the public utilities at the expense of independent electrical appliance merchants.

Furthermore, they contended that representatives of the TVA and EH&FA and the public utilities were entering into an unlawful combination in restraint of trade, designed to drive the independent electrical merchant out of business.

In his report to President Roosevelt for the first 10 months of TVA operation, Arthur E. Morgan, chairman of the authority, told of the progress being made in the distribution of low-cost power, encouragement of local industries, and the use of natural resources, soil erosion work, transportation, and economic planning, and asked that the program be continued and extended.

Shortly afterward George D. Munger came from the Central Hudson Gas & Electric Co., Poughkeepsie, N. Y., to assume commercial membership of the EH&FA. William B. Phillips was named assistant to the EH&FA president, and Forrest C. Allen director of public relations.

EH&FA Starts Merchandising

David E. Lillenthal, president of EH&FA, announced near the end of May that the selling of low-cost appliances would begin in areas served by the TVA and those served by the Commonwealth & Southern Corp., utilities in Georgia, Tennessee, and Alabama.

This led to the protest to the President by Georgia dealers, while those in Alabama met with the EH&FA head to obtain what they termed a "fair and equitable" deal for themselves in connection with the government's program.

Later the EH&FA agreed to finance retail sales of approved appliances by the Cartersville, Ga., municipal utility, the first utility not using TVA power to receive this aid. Georgia dealers, meanwhile, were active. Protests were sent to the Georgia Power Co., that its sales of the interim models

were killing their own sales of other models.

The problem increased in intensity with decision of Knoxville, and northern Alabama towns, to abandon their former systems and use TVA power.

Interim Models Hurt Sales

In a survey of dealer opinion, ELECTRIC REFRIGERATION NEWS found the war on utility merchandising of TVA refrigerators especially heated in Atlanta, Ga. The claim that the "interim" models (and before their arrival the rumors concerning them) had done much to slow up sales, was generally heard. These "interim" models were standard 4 cu. ft. boxes, stripped to bare essentials, and offered at low prices "until special TVA models can be manufactured."

Dealers asked a 40% distributor-to-dealer discount as a minimum margin on all TVA model refrigerators, saying their present combined discount figured about 27%.

Dealers in Nashville also expressed their opposition to the TVA, particularly because of the utilities' selling campaign. Tupelo, Miss., "proving ground" of the government's project, was one of its most ardent boosters, and dealers there could see naught but good in the EH&FA appliance promotion.

Opinions on Value Differ

Knoxville dealers viewed the future in rosy light, expecting TVA control of the local utility company to prove a considerable boost to their sales.

Opinion in Chattanooga, however, was varied, with most dealers contending that while TVA promotion had been of considerable help, the interim models, merchandised in the main by the Tennessee Electric Power Co., had been a potent factor in cutting down profits.

Least perturbed of the three states affected was Alabama. Here dealers felt as did those in other states regarding the general outline of TVA, but since the state's utility, Alabama Power Co., had made no move to push the interim models after its original stock of 500 was disposed of, conditions were much more friendly.

Neither was there a desire on the part of either the Alabama Power Co. or dealers to concentrate on the new chest models, which the industry brought out especially for the TVA project designed to retail for \$79.50. This utility, it appeared, was keeping faith with independent dealers, and in general evidenced a desire to work with them rather than against them.

Not to Spread Nationally

At the same time George D. Munger, commercial manager of the EH&FA stated that the government would not extend its promotion of lower-priced electrical appliances on a national scale.

EH&FA next brought out a traveling kitchen, designed to show small-town and rural home-owners what electricity could do for them, and started it on its tour Sept. 3.

Miss Ruth Frow, Maryville, Tenn., went with the traveling kitchen series of cooking schools in the territory where TVA power was available.

Sept. 5, the EH&FA announced that it would extend finance terms to all products in a line, if the manufacturer had an approved TVA model, and also that dealers would in the future deal direct with EH&FA on time-payment sales, lifting responsibility from the manufacturer.

Model Showroom Opened

A model showroom was opened by this governmental agency in Chattanooga in September, with an air-conditioning exhibit as one of its principal features, as well as a household service center to further electrical appliance usage by home owners.

Coal and ice dealers in Alabama launched an attack against the TVA early in October, claiming government competition would be harmful to their business.

The National Coal Association, vigorously opposing extension of TVA power activities, issued a booklet predicting as its probable effects (1) Displacement of a market for six million tons of coal a year due to use of water-power instead of steam, (2) elimination of 120,000 carloads of revenue freight from railroads annually, (3) loss of over 12 million dollars annually in rail revenue, half of which goes to labor, (4) loss of six million dollars in wages, and (5) the closing down of hundreds of mines.

Speaking at a meeting of EH&FA and TVA officials in Chattanooga, T. K. Quinn, vice president of the General Electric Co., pointed to the co-operation of utilities and manufacturers in the government's program, and David E. Lillenthal, EH&FA head, looked to that organization as a pioneer in the work of providing the nation with cheap electricity, struck at critics whom he said sought

a chance to gouge the unorganized buying public, and called on Southern states to give united support to the program.

Roosevelt Warns Opponents

On Nov. 18, President Roosevelt gave the TVA program the "full speed ahead" signal in speeches at Tupelo, Miss., and Birmingham, concluding his round-up of the project when he said: "What you are doing here is going to be copied in every state in the Union before we get through."

Tossing a challenge to opponents of the system, the chief executive said TVA was no longer in the experimental stage, and that "obstructionists" would do well to get in line while the getting was good.

He cited the rise in consumption of electric power since the TVA's inception, a gain of from 41,000 to 89,000 kilowatts, or 126%, and said that the number of electric refrigerators installed meant more than dollars and cents—it meant a greater human happiness.

The rise in the standard of living, he said, was the best evidence that the people of the Tennessee Valley appreciated what the government was trying to do for them and were co-operating in it.

Memphis, Knoxville Join TVA

Memphis and Knoxville came into the TVA fold during November, the former by a majority vote of its citizens and the latter by determining to take advantage of a loan and grant of \$2,600,000 authorized by the PWA to help it obtain TVA power. Utilities began to take active notice of this new threat to their existence.

In a letter sent to all employees, Georgia Power Co. explained what would happen if the TVA took over the power business in that state, but emphasized that before Atlanta could take advantage of the lower power rates, an expenditure of \$20,000,000 would be necessary to establish a city-owned distribution system, and expressed doubt that the city would consider the difference between TVA and Georgia Power Co. rates great enough to make that change in preference to other improvements of which it was more in need.

Tax Loss Great

Doubt was also expressed as to whether the city would be quick to give up its income from Georgia Power's taxes, for such tax loss was deemed inevitable should the municipality join up with TVA, and set up its own electrical business.

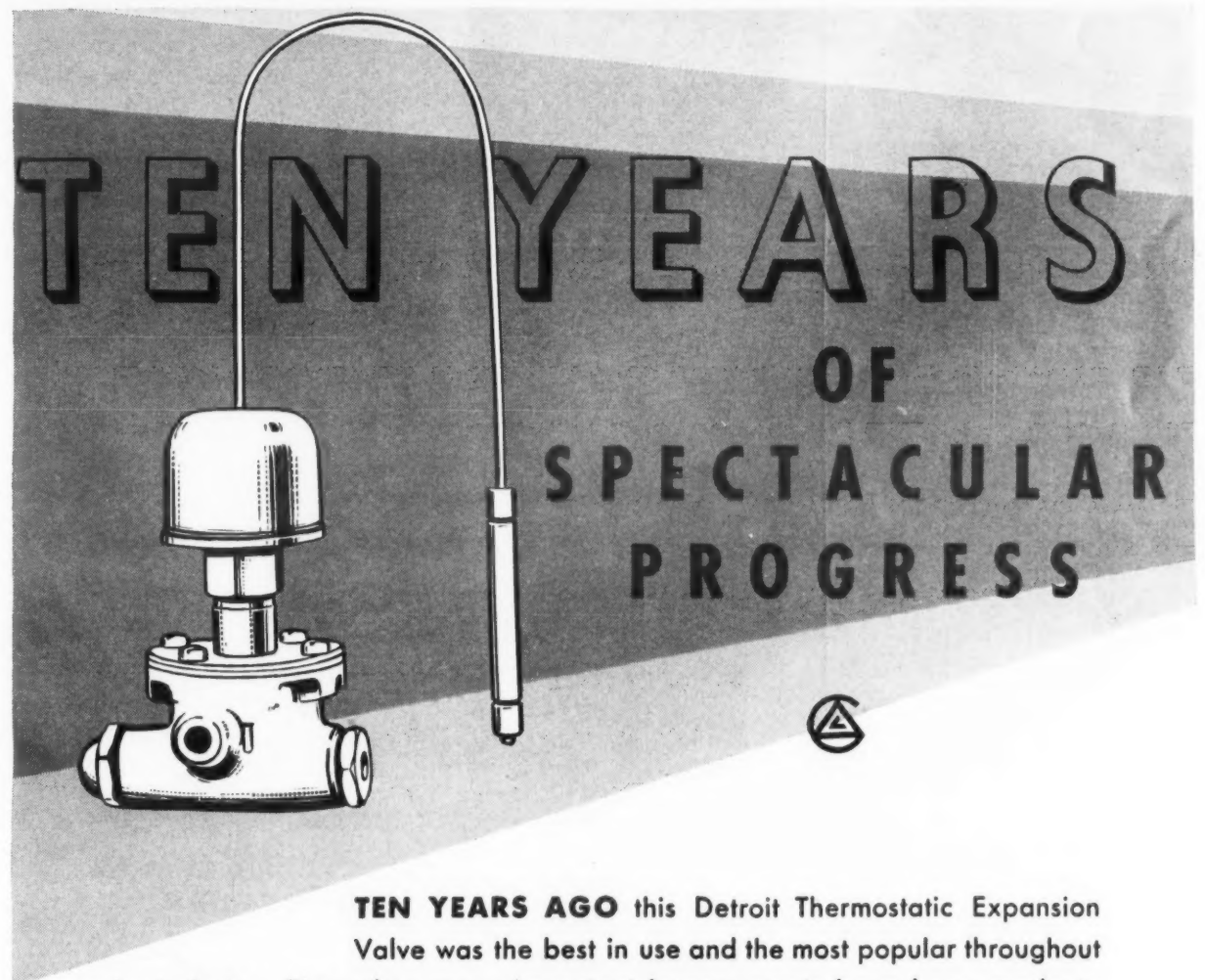
W. J. Frankston, president of the Wheeling, W. Va., Chamber of Commerce, wrote that extension of the TVA program presented the danger that Wheeling and other cities in the upper Ohio Valley might be deprived of growing industries and later established ones, which would naturally be drawn to the Tennessee Valley where power rates were cheaper. He also pointed out the futility of municipalities attempting to compete with the government in bidding for new industries.

(To Be Concluded Next Week)

Domestic Electric Co. Gets Combustioneer Franchise

BIRMINGHAM, Ala. — Domestic Electric Co., 114 South 20th St. here, has been appointed distributor for the Combustioneer Stoker Co. in the north Alabama territory. Domestic Electric Co. is also distributor for Frigidaire, Delco, and Lipman products.

W. C. Knopf, head of the company, believes that coal burning products should have a market in Birmingham particularly because of north Alabama's coal fields, and the consequent low cost of this type of fuel.



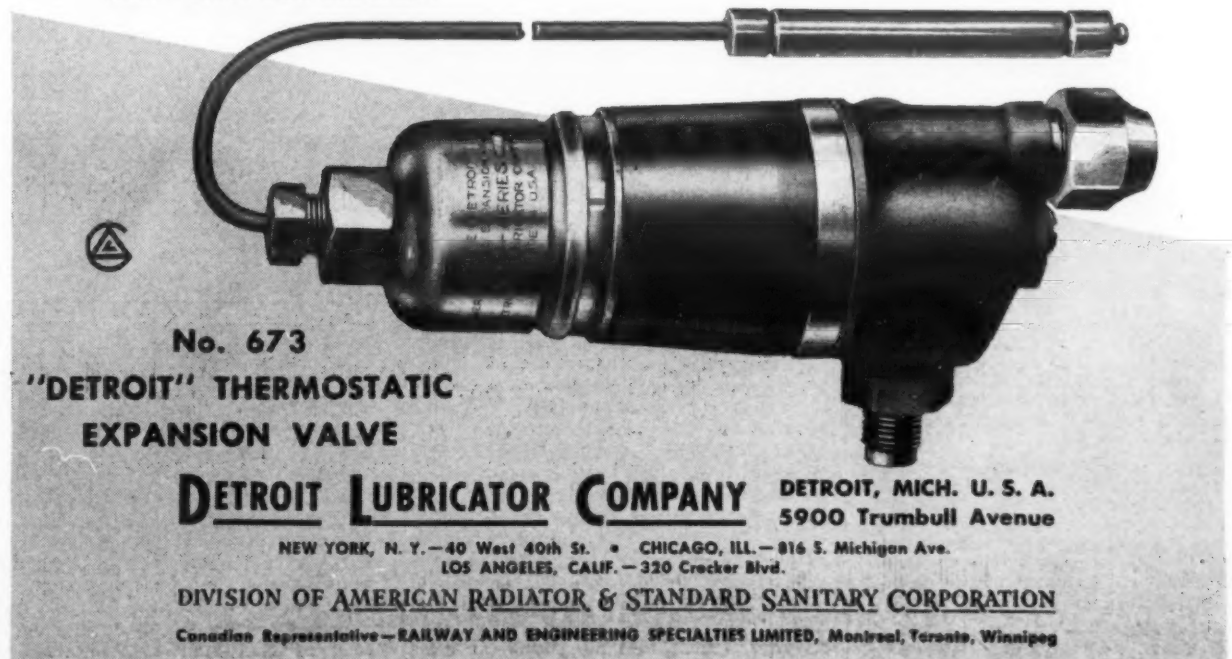
TEN YEARS OF SPECTACULAR PROGRESS

TEN YEARS AGO this Detroit Thermostatic Expansion Valve was the best in use and the most popular throughout the industry. Since then many important improvements have been made to raise its efficiency and lengthen its service life.

TODAY every Detroit Thermostatic Expansion Valve incorporates the following outstanding advantages.

- 1 Delubaloy needle and seat.
- 2 Swivel needle and frictionless yoke construction.
- 3 Duraflex bellows.
- 4 Hermetically sealed body.
- 5 Gas charged power element.

Write for bulletins describing the application and operation of Detroit Expansion Valves and Controls.



No. 673
"DETROIT" THERMOSTATIC EXPANSION VALVE
DETROIT LUBRICATOR COMPANY DETROIT, MICH. U. S. A.
 5900 Trumbull Avenue
 NEW YORK, N. Y. — 40 West 40th St. • CHICAGO, ILL. — 816 S. Michigan Ave.
 LOS ANGELES, CALIF. — 320 Crocker Blvd.
 DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION
 Canadian Representative — RAILWAY AND ENGINEERING SPECIALTIES LIMITED, Montreal, Toronto, Winnipeg

CALENDAR OF THE ELECTRIC REFRIGERATION INDUSTRY'S DECADE OF GREATEST PROGRESS—1926 TO 1936

Record of Industry's Growth Taken from Electric Refrigeration News Tells the Story In Terms of Men, Products and Methods

Editor's Note: The following digest of news events reported in *ELECTRIC REFRIGERATION NEWS* for the past 10 years provides a dated record of those happenings which have had an important bearing on the industry's progress. The dates given are those of issues of the *NEWS* in which the events were reported.

1926

Sept. 11:

ELECTRIC REFRIGERATION NEWS appears as bi-weekly publication with the following editorial policy: (1) To encourage the development of the art; (2) To promote ethical practices in the business; (3) To foster friendly relations throughout the industry; (4) To provide a clearing house for new methods and ideas; (5) To broadcast the technical, commercial, and personal news of the field.

Representatives of Kelvinator, General Electric, Servel, Copeland, and Frigidaire meet Sept. 10-12 at Waldenwoods, Hartland, Mich., to perfect organization of Electric Refrigeration Council and co-operate in publicity and advertising campaigns calculated to bring the infant industry to the attention of the buying public.

Delco-Light Co., Dayton, files suit against General Necessities Corp. (Absopure), Detroit, charging infringement of patent rights; plaintiff company seeks to establish exclusive rights to air-cooled machine.

Kelvinator consolidates manufacturing operations with Nizer division in new Detroit plant costing \$4,500,000.

Couzens Ice Machine Co., Detroit, abandons business. Senator James Couzens, owner, says industry bound up with time payment plan, and therefore economically unsound.

Harry W. Alexander appointed general manager of Refrigeration Division, The Lamson Company, Syracuse, N. Y.

H. K. Patterson, sales manager of Kelvinator-Canada, Ltd., London, Can., first subscriber to *NEWS*.

Oct. 6:

Frigidaire Corp. formed Sept. 15, separating the electric refrigeration division of General Motors from Delco-Light farm lighting division. E. G. Biechler named president-general manager, and 50,000-unit per month production plan proposed.

Advertising committee of Electric Refrigeration Council sets aside \$123,500 of \$166,000 advertising budget for 1927 to provide 13 full-page two-color advertisements in Saturday Evening Post.

Editorial in *NEWS* condemns pirating in industry.

San Ford Automotive Products Corp. changes name to Sanitice Corporation and plans production of electric refrigerators.

Oct. 30:

Coldak Corp., New York, purchases Alaska Refrigerator Co., Muskegon, Mich., for \$1,700,000.

Ten manufacturers represented at Boston show. Daily attendance at Servel's Chicago exhibit averages 18,000.

NEWS offices moved from 818 Hancock Avenue to second floor, Printing Crafts Building.

Electric Refrigeration Corporation (Kelvinator-Nizer-Leonard), Detroit, lists assets of \$8,157,561 and liabilities of \$822,108.

Nov. 20:

General Necessities Corp. answers Delco-Light complaint listing several patents allegedly anticipating those of plaintiff company.

Appointments: A. P. DeSaas as president of Coldak; R. L. Windmuller as sales manager of General Refrigeration Co.; Ross Schram as assistant to president of Absopure.

Dec. 8:

Charles B. Van Keuren, Electric Refrigeration Corporation, tells National Association of Ice Industries convention, Chicago, that electric refrigeration industry spent \$5,000,000 in advertising in 1926 and will spend \$10,000,000 in 1927. Urges co-operation of ice and electric refrigeration industries for mutual benefits.

Polaris Electric Refrigerator Co., takes over Universe Corp.

Frigidaire's 1927 retail sales estimated at \$160,000,000.

Appointments: H. W. Prior as general sales manager of Frigidaire; Howard R. Lukens as general manager of Welsbach.

Dec. 22:

Superior Iceless Refrigerator, Inc., takes over Couzens Ice Machine Co. New product called "Superior." Officers: Charles A. Kolp, president; Edward L. Frantz, executive vice-president.

James B. Gilmer, San Antonio Kelvinator distributor, criticizes *NEWS* headline—"Undesirable Publicity From Accidents"—and story reporting deaths from refrigerant detrimental to progress of industry. *NEWS* editorial reaffirms policy of paper as impartial and unbiased news organ of the industry.

C. W. Matheson elected vice-president of Kelvinator.

1927

Jan. 5:

NEWS survey predicts 1,000,000 units will be sold in 1927. Sales for 1926 total 350,000.

A. H. Goss named representative of American electrical refrigeration industry to Fifth International Congress of Refrigeration at Rome in September.

NEWS editorial urges elimination of "knocking-the-ice-man" policy.

Appointments: H. W. Burritt as executive vice-president of Kelvinator; T. K. Quinn and P. B. Zimmerman as manager and sales manager, respectively, of newly-formed electric refrigeration department of General Electric.

Frigidaire's Leader



When the Frigidaire Corp. was separated from Delco-Light in 1926 E. G. Biechler became president of both companies.

Jan. 19:

Kelvinator's new \$4,500,000 Detroit plant dedicated with 4,000 dealers, distributors, company executives and employees in attendance.

Frigidaire takes over Detroit plant space of Northway Motor Company.

Appointments: Samuel W. Phelps as wholesale manager of Lamson; B. A. McDonald as vice-president and treasurer of Electric Refrigeration Corp. and president of Refrigeration Discount Corp.

Feb. 2:

General Electric electric refrigeration department set up in Cleveland. Schenectady and Fort Wayne plants producing eight new models. Department gets \$1,000,000 advertising budget for year.

Electrical League of Cleveland appoints major portion of 1927 advertising budget for electric refrigeration promotion.

New N. E. L. A. Refrigeration Committee begins formulation of data on electrical refrigeration for electric service companies.

Iron Mountain Co., Chicago, abandons oil burner production to concentrate efforts on production of Zerozone refrigerators.

Harry C. Leonard appointed general manager of Leonard division of Electric Refrigeration Corporation.

Feb. 16:

Universal Cooler Corp., Detroit, announces production mark of 20,000 units.

Directs Kelvinator Sales



Henry Burritt has headed up Kelvinator's sales forces since 1927. He is now vice president.

for 1927. A. DeB. Gaines named sales manager of expanded organization.

Rex Manufacturing Co., Connerville, Ind., starts production of all-steel cabinets for electric refrigerators.

Mar. 2:

Kelvinator and Nizer divisions complete

(Continued on Page 21, Column 1)

10 Years Ago this Month—A Business Paper Is Born to Record the History of a Young Industry

Special Waldenwoods Edition ELECTRIC REFRIGERATION NEWS

The business newspaper of the electric refrigeration industry

Vol. I, No. 1

DETROIT, MICHIGAN, SEPTEMBER 11, 1926

PRICE TWO CENTS

National Educational Plan Approved by Electrical Leaders

Broad Program Co-ordinating Local and National Effort
Enthusiastically Endorsed at League Conference

Two hundred fifty men and women, representing all branches of the electrical industry attending "Camp Co-operation," the sixth annual conference of local electrical leagues with the Society for Electrical Development, held on Association Island in Lake Ontario at Henderson Harbor, N. Y., September 3, adopted a program which is destined to make another important contribution to American business history and electrical progress.

The plan has been prepared after months of study by the Society for Electrical Development in co-operation with 180 Electrical Leagues in various cities of the United States and Canada, calls for a continental organization in which 400 or more local co-operative groups will become "chapters" of the society, thereby providing the facilities for carrying out a five-year market development campaign to educate the public to a fuller appreciation of electricity as "a way of better living."

Designed to make competition constructive, the plan has been approved in principle by Thomas A. Edison, Herbert Hoover and executives of the leading public utilities, manufacturers, wholesalers, retailers and contractors. It contemplates no reduction of competition among manufacturers and distributors, but is designed to make competition constructive and profitable.

The anticipated increase in the use of electricity and electric devices is expected to lower costs while increasing the public comfort and convenience. It is aimed to reduce greatly the surprisingly heavy load of drudgery and discomfort that still rests on Americans in spite of the fact that they are making greater use of the benefits of electricity than any other people on earth.

American Homes Still Burdened With Drudgery
Dr. Louise Stanley, director of the Bureau of Home Economics in the Department of Agriculture at Washington, declared in a address at the island that there is more drudgery left in American homes today than most people think, and that more electrical labor saving is a crying need. She knows of a home where the only labor saving device is a water bucket, so that the housewife now makes one trip to the well instead of two. Dr. Stanley said she hopes the new plan will spread electrical education so completely that no more such homes exist.

The program for the plan will come from special product promotion funds and from membership fees both national and local. Those of each classification being divided on a 50-50 basis. The committee, which is the national group will lay down policies governing advertising programs, educational campaigns and activities of various sorts. Particular products will have separate support, each one directed nationally under the general plan by a unit of its own. In each chapter-league will be similar boards and officers, and such product units as the chapters may wish to create.

Department Stores to be Included in Plan
An important novelty in the big plan is that, for the first time, the electrical industry is linking non-electrical retail distribution, such as department stores, with the local power company and the contractor-dealer who wire houses and sell fixtures and appliances.

Electrical Refrigeration Publicity Has Shown Possibilities of Co-operation
Part of this plan for co-operation is already in operation through the Society for Electrical Development, whose headquarters are at 222 Fifth Ave., New York City. An educational campaign devoted to electric refrigeration has been in active progress for six months and has given millions of people information about the new way of perfecting food in the "Red Seal Plan" of adequate food wiring to insure the conservation of electricity in the home, the society and co-operating leagues have an example of one activity among the many which may be encompassed in the national market development plan.

(Continued on page 2, column 2)

Editorial Aims of The Electric Refrigeration News

To encourage the development of the art.
To promote ethical practices in the business.
To foster friendly relations throughout the industry.
To provide a clearing house for new methods and ideas.
To broadcast the technical, commercial and personal news of the field.

EDISON IMPRESSED Expresses High Opinion of Electric Refrigeration Program in a Telegram

Orange, N. J., Sept. 3

J. Robert Crouse, Association Island.
Dear Mr. Crouse:
Your letter of August 26 together with the Waldenwoods pamphlet and the special electric refrigeration reports from the S.E.D. have been brought to my attention by Mr. Meadows and I have read same with a great deal of interest (stop) I am deeply impressed with the Society's advertising on electric refrigeration (stop) It has been placed upon the high plane it deserves and is another manifestation of the wisdom displayed in the founding and continuance of the S.E.D. (stop) Its fundamental keynote, co-operation, has justified itself in results so far and the program stretches out to infinity (stop) Please

Society for Electrical Development to Present Enlarged Program

Plan Calls for Organizing Local Groups in the
Eighty-one Principal Cities.

J. Robert Crouse, speaking on the local co-operation in electric refrigeration, declared in his address at the Waldenwoods, outlined the proposed advertising and publicity plan which will be presented to the Electric Refrigeration Manufacturers at Waldenwoods.

"This organized co-operative market development plan, added to the competitive work of all the different distributors, in my judgment represents a new tool for market development which dollar for dollar of both competitive and co-operative expense means a net gain in sales efficiency, faster education of the public, larger sales, more profits, and the elimination of certain sorts of competitive friction and waste which results in no benefit either to the public or to the manufacturers."

"Organized co-operative market development is added to the competitive work of all the different distributors, in my judgment represents a new tool for market development which dollar for dollar of both competitive and co-operative expense means a net gain in sales efficiency, faster education of the public, larger sales, more profits, and the elimination of certain sorts of competitive friction and waste which results in no benefit either to the public or to the manufacturers."

What has been done in Cleveland can be duplicated at least within two years in the other eighty-one cities of one hundred thousand population or more in the United States, and local organization could be carried on down to the cities of smaller population if later advisable. "I do not quite see the results in Cleveland as being anything startling, and do not know whether they are above or below the average, for a co-operative campaign such as here set up has in its object the proper education of the public to the idea of

(Continued on page 2, column 4)

Electric Refrigeration Council Meets Again at Waldenwoods

Industry Association returns to Place of Birth To Perfect
Organization and Consider Cooperative Plans

Six of the leading manufacturers of electric refrigerators, now co-operating in a publicity and advertising program being handled by the Society for Electrical Development, are meeting at Waldenwoods, near Hartland, Michigan, Friday, Saturday and Sunday, Sept. 10-12, to consider an extension of the present program and to perfect their trade association, the Electric Refrigeration Council, which was organized on a tentative basis at the Westchester-Biltmore Country Club, Rye, N. Y., in January.

This is the fourth meeting of the group which now includes the Kelvinator and Nizer divisions of the Electric Refrigeration Corporation, General Electric Co., Servel Corp., Copeland Products, Inc., and Delco-Light Co. (Frigidaire). The first meeting held at the Westchester-Biltmore Country Club, Rye, N. Y., in January, 1926, was called by J. Robert Crouse, president of the Nizer Corp. with the main objective of promoting personal acquaintance and friendly relations among the executives and department heads of the competing manufacturers. It was attended by representatives of the Nizer, Kelvinator, Servel and Frigidaire companies.

The second meeting was held in the fall of 1925 at Delco Dells, near Dayton, Ohio, where E. G. Biechler, president of the Delco-Light Co., was host to the visitors. At this meeting General Electric Co. was also represented.

In January, 1926, the third meeting was held at the Westchester-Biltmore Country Club, Rye, N. Y., by H. G. Scott, chairman of the board of the Servel Corp., who was host on this occasion. Copeland Products, Inc. joined the group at this time.

At the meeting now in session, A. H. Goss, president of the Electric Refrigeration Corp., will preside on behalf of the Kelvinator Division. The Westinghouse Elec. & Mfg. Co. has been invited to participate in the activities and will be represented by S. L. Nicholson, acting vice-president and E. B. Mallory, manager of the electric refrigeration division.

The program of the meeting appears on page 3.

JOINS LAMSON Harry W. Alexander is Appointed as General Manager

Harry W. Alexander, well known in the electrical industry, has been appointed general manager, Refrigeration Division of The Lamson Company, Syracuse, New York. This company, large manufacturer of department store, industrial and bank refrigerators, has been known since the "Ice Man" unit. Mr. Alexander retains his position as advisor to the Red Refrigerator Company and Otis-Brookers, Inc., Baltimore, refrigerated case and cabinet manufacturers. He will continue inactive as vice-president of The Edison Manufacturing Co., gas and water heaters, New York, and vice-president and treasurer of the Sherwin-Cody Business Ability Institute, New York, with which companies he has long been identified. Mr. Alexander was for several years Sales Manager of the Federal Light and Traction Company, and later, sales and publicity manager of the Society for Electrical Development, and in charge of sales and advertising of the American Electric Paper Company, Holyoke, Mass. For the past few years he has conducted a personal service organization along sales and financing line.

Alex Dow to Address Electric Refrigerator Manufacturers

Alex Dow, president of the Detroit Edison Company, foremost among the public utility executives of the industry, will be the principal speaker at the meeting of the Electric Refrigeration Council, at Waldenwoods, Michigan. He will address the gathering at the closing session on Sunday, September 12th.

four competitive companies met each other for the first time.

In the fall of the same year E. G. Biechler, president of the Delco Light Co. (forerunner of Frigidaire), invited the same group to a similar meeting at Delco Dells (just outside of Dayton, Ohio). A fifth company, General Electric, was represented in these sessions.

In January, 1926, H. G. Scott, chairman of the board of Servel, Inc., was host at a third meeting held at the Westchester-Biltmore Country Club, Rye, N. Y. The Copeland

company participated in this meeting.

At the Westchester-Biltmore the six companies formally organized the Electric Refrigeration Council and subscribed equally to a fund of \$100,000 for a cooperative advertising and educational program. F. M. Cockrell was appointed acting secretary of the Council.

In the fall of 1926 the fourth meeting of the group was held at Waldenwoods and it was this event which marked the beginning of *ELECTRIC REFRIGERATION NEWS* as the newspaper of the industry.

THE FIRST ISSUE of *ELECTRIC REFRIGERATION NEWS* made its appearance at a three-day meeting of the Electric Refrigeration Council, held at Waldenwoods, Mich., Sept. 10, 11, and 12, 1926. Copies of the "Special Waldenwoods Edition" were distributed at the breakfast table on Saturday morning, Sept. 11.

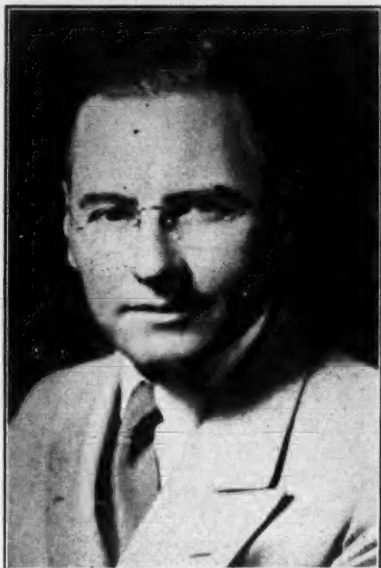
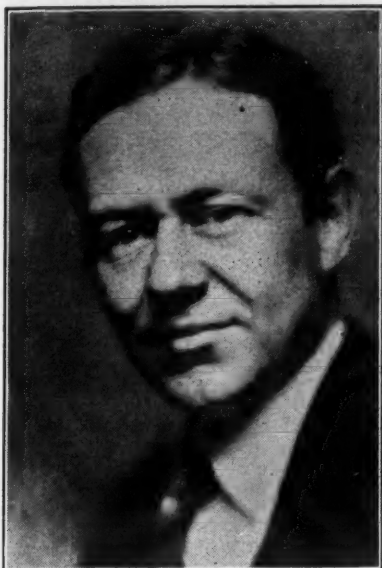
The front page, reproduced above, carries the pictures of J. Robert Crouse, president of the Nizer Corp., and A. H. Goss, president of Kelvinator Corp., both of which companies at that time were divisions of the

Electric Refrigeration Corp.

Mr. Crouse was known as "the father of cooperation in the electrical industry." He had organized The Society for Electrical Development back in 1913 and he was the first to undertake a cooperative movement in the electric refrigeration field.

In the spring of 1925 he invited the executives and department heads of the four electric refrigeration manufacturing companies (Kelvinator, Nizer, Servel, and Frigidaire) to meet informally at his Waldenwoods estate. Most of the men representing the

They Led the G-E Parade Into Refrigeration Field



T. K. Quinn (left) and P. B. Zimmerman were the two men principally responsible for General Electric's spectacular entrance into electric refrigeration. Zimmerman is now head of the G-E Specialty Appliance Sales division, but Quinn, who rose to be vice president of the company, resigned about a year ago to join the Maxon advertising agency.

1927

(Continued from Page 20, Column 5) removal to new Detroit plant without suspension of operations.

NEWS editorial comments on increasingly large number of former automobile executives entering electrical refrigeration industry in key positions.

Appointments: C. K. Woodbridge as general manager of Electric Refrigeration Corp.; Albert M. Taylor as Copeland advertising manager; A. H. Meinke as Universal Cooler director of sales.

Mar. 16:

Norge Corp. formed in Detroit, to operate in plant of Detroit Gear & Machine Co. Howard E. Blood named president with E. E. McCray as chairman of the board.

Ice-O-Lator starts production of both electric and gas models at New Haven plant.

NEWS estimates about 50 companies engaged in production of electric refrigerators.

Appointments: C. B. Ryan, Jr., as manager of service and sales promotion for Welsbach; A. B. Hatch as public relations director for same company.

Mar. 30:

Everite Products, Inc., Detroit, start production of "Everite" electric refrigerator. F. C. Gieler elected president and general manager.

Toledo Edison claims world's sales record for single month having sold 560 units in city during February.

NEWS subscriber list reaches 2,000 mark with 13th issue.

Apr. 13:

Michigan Refrigeration, Inc., starts production of "El-Frig-Ette" machine in Grand Rapids plant formerly occupied by Cheney Talking Machine Co.

Frigidaire, Ltd., organized to handle company's business in England, France, Germany, and Italy.

Apr. 27:

Annual convention of Frigidaire salesmen attended by 2,500 at Dayton plant. E. G. Blechler tells convention production will go on 50,000-unit per month basis effective May 1 and reports 1926 dollar volume sales of \$82,000,000. Alfred P. Sloan, president of General Motors, predicts \$100,000,000 plant investment for Frigidaire within two years. Sales exceeded in G. M. only by Buick and Chevrolet automobile divisions.

Industry sales growth of from 600 units in 1914 to 600,000 in 1926 announced.

May 11:

National Association of Ice Industries proposes to spend \$200,000 on advertising in 1927. Electrical refrigerator manufacturers will spend \$10,000,000 for same purpose during the year.

Merchant & Evans Co., Philadelphia, begin production of "M & E" machine.

Frank E. Smith elected president of Servel.

May 25:

N. E. L. A. convention program announced with prominent place given to

electric refrigeration on program for first time.

NEWS offices moved to fifth floor of Maccabee building, Detroit.

June 8:

Electric refrigeration exhibits dominate 15th annual convention of N. E. L. A. at Atlantic City. NEWS staff moved to Young's Million Dollar Pier to publish edition at convention site.

A. S. R. E. proposes standardization of box sizes for facility.

June 22:

C. K. Woodbridge succeeds A. H. Goss as president of Electric Refrigeration Corp.

Mechana-Kold Corp., Bay Shore, N. Y. enters field.

Fowler Refrigeration Machine Corp., Baltimore, announces production of electric refrigeration unit.

July 6:

NEWS editorial stresses fact that "canned" sales talk is obsolete in electrical refrigeration selling.

July 20:

U. S. Department of Commerce calls meeting at Cleveland for manufacturers to consider standardization and simplification of units.

New York City Fire Department submits ordinance amending 1915 safety code covering electric refrigeration installations to Board of Aldermen.

Sales for first half of year reported to be 390,000 units.

NEWS begins publication of condensed directory of industry.

Aug. 3:

John Wanamaker New York Store sponsors first large department store exhibit of electric refrigerators.

Aug. 17:

Reorganization committee begins reorganization of Servel interests by consolidating eight companies controlled by the corporation.

Complete directory of industry published for convenient reference.

Aug. 31:

Hvid Machine Corp., Chicago, begins manufacture of "Snow Queen" machine.

Sept. 14:

General Electric distributors hold first annual convention at "Camp Refrigeration," Association Island, N. Y., Sept. 5-8.

William L. Cummings, Boston Frigidaire distributor, enters 10-year subscription to NEWS.

J. R. Replogle and S. M. Wurl resign engineering posts with Nizer.

Appointments: R. F. Callaway as assistant to E. G. Blechler; R. M. Very as sales promotion manager of Welsbach.

Sept. 28:

Industry seen as having adopted correct name "electric refrigeration" for service rendered: electricity the means, and refrigeration the object.

E. B. Mallory appointed president of Climax Electric Refrigeration Co.

Crosley introduces absorption unit for farm use.

Oct. 12:

Nine concerns merge to form York Ice Machine Corp.

Theodore Slade appointed director of public utility sales for Kelvinator.

Oct. 26:

NEWS editorial discusses refrigeration and radio as complementary lines offering radio dealer solution to summer slump characteristic of radio selling.

Nov. 9:

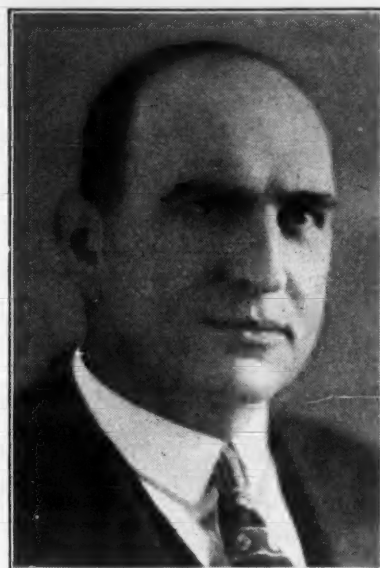
New York section of A. S. R. E. views electric air-cooling system in Roxy theatre. W. H. Carrier notes increasing tie-

Norge Top Executive



Howard E. Blood headed the group who fostered the production of the household refrigerator with the "rollator" compressor.

Presided over Engineers



One of the industry's best-known engineers, George Bright was president of the A.S.R.E. in 1928.

up between refrigerating and heating-ventilating engineers. Conferees hear lecture on cooling installations by L. L. Lewis in first noteworthy demonstration of approaching air-cooling machinery.

Walker Electric Refrigeration Co., Detroit, buys Port Huron, Mich., plant.

Allison machine produced on 35-a-day basis by Domestic Electric Refrigerator Corp.

Appointments: Edward L. Barger as service manager of Copeland; Curtiss G. Dunham as president of Universal Cooler.

Nov. 23:

New York Safety Code gets final hearing before Board of Aldermen.

Nov. 18:

John Wanamaker New York store sells

100 electric refrigerators during seven-day show.

NEWS editorial urges organization of elements of industry, citing decline of Electric Refrigeration Council.

NEWS publishes tabulation of key electric refrigerator specifications.

Subscriber list reaches 4,337 mark.

Dec. 7:

Servel reorganization plan becomes operative.

George B. Bright elected A. S. R. E. president.

Dec. 21:

L. M. Simpson elected president of Electro-Kold.

(Continued on Page 22, Column 1)

Dynamic Servel President



The late Col. Frank E. Smith was president of Servel, Inc., for a number of years.

TEN YEARS AGO...

Servel — already an old name in commercial refrigeration — watched with interest the birth and development of Electric Refrigeration News.

TODAY...

Servel congratulates the *News* on its tenth successful year, and wishes its management "Many Happy Returns."

TEN YEARS AGO—Servel offered five commercial machines, 1/6 ton to 1/2 ton capacity. **TODAY**—Servel blankets the field with forty-four models ranging from 1/10 ton to 20 tons, adaptable to every temperature requirement from ice cream hardening to air conditioning.

TEN YEARS AGO—Servel distribution was limited to the large cities, **TODAY**—Servel is sold and used everywhere.

TEN YEARS AGO—a half-ton Servel refrigerating machine cost the user

\$650.00, plus freight. **TODAY**—the same capacity costs less than half as much.

TEN YEARS AGO—users were enthusiastic in their praise of Servel equipment. **TODAY**—many thousands of these early customers are still using their machines and recommending the new Servel to their neighbors.

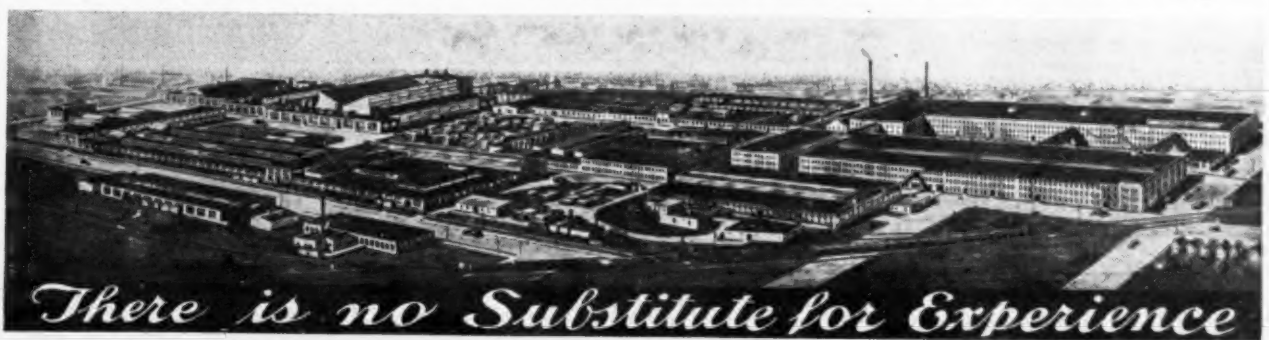
Servel distributors everywhere derive real profit and satisfaction in the sale of a product with this most enviable record of achievement.

SERVEL

COMMERCIAL REFRIGERATION

SERVEL, INC. Commercial Refrigeration Division EVANSVILLE, IND.

This modern 33-acre plant is the home of Servel Commercial Refrigeration and the world-famous Electrolux, the Servel Gas Refrigerator



There is no Substitute for Experience

PELCO Electric Beverage-Food COOLER



Combination Beverage Cooler and Food Refrigerator

Ideal for any place that sells bottled beverages and lunches! A 2 in 1 idea that makes it easy to sell—and a profit maker for the buyer! Upper compartment cools beverages quickly from room temperature to 40°—lower compartment keeps food in perfect condition. Pelco makes its own ice—plugs into any light socket.

Write at once for full details of 3 models to Desk A,

Refrigerator Division
PORTABLE ELEVATOR MFG. CO.
BLOOMINGTON, ILLINOIS

The Most Practical Unit You've Ever Seen!

DOUBLY USEFUL to

Restaurants
Taverns
Road Houses
Refreshment Stands
Billiard Parlors
Bowling Alleys
Resorts
Cigar Stores
Delicatessens
Bakeries
Creameries

or any place that serves bottled beverages and lunches

'Father of Air Conditioning'



Willis Carrier is generally considered as the "founder of the air-conditioning industry" because he set forth, in papers and addresses, the principles on which the industry has developed.

(Continued from Page 21, Column 5)

1928

Jan. 4: NEWS publishes "1928 Catalogue and Directory Number," providing industry with comprehensive survey of electric refrigeration industry.

NEWS editorial expresses optimism concerning future of industry in 1928. Calls 1925 year of promotion, 1926 year of over-expansion, and 1927 year of reorganizations and readjustments of electric refrigeration industry.

Servel subsidiaries merged into one company with Frank E. Smith, president; W. F. Thatcher, vice-president; H. W. Foulds, general sales manager, and C. A. Miller, general service manager.

Jan. 18: Freezel Corp. organized at Gardner, Mass.

Charles C. Small, president of American Ice Co., says industry will be made over within next ten years due to electric refrigeration competition.

Feb. 1: N. E. L. A. endorses central station campaign to sell 500,000 electric refrigerators to American home owners during 1928.

Electric Refrigeration Corp. changes name to Kelvinator Corp.

Williams Oil-O-Matic Heating Corp., Bloomington, Ill., enters field with "Ice-O-Matic" line.

Feb. 15:

Survey estimates 31,000 electric refrigerators in use in metropolitan New York.

Appointments: C. E. Jernberg as president of Zerozone; Ralph M. Douglass as director of advertising for Kelvinator; L. W. Ward as Norge general sales manager; John F. Plummer as vice-president and general manager, Domestic Electric Refrigerator Corp., New York.

Feb. 29:

Schneider Manufacturing Co., Omaha, Neb., starts production of "Icelect" machine.

NEWS subscriber mark passes 5,000 after 17 months of publication.

Mar. 14:

Frozone Corp., Philadelphia, starts production.

Central station executives, replying to NEWS telegrams, generally agree \$30 reasonable amount to invest to secure added load revenues from electric units, that 10 per cent of domestic customers are immediate prospects, and that they will use 1928 N. E. L. A. advertising plan.

Frigidaire Executive



Carl A. Copp was appointed as assistant to Mr. Biechler at Frigidaire in 1928.

Appointments: C. A. Copp as assistant to president of Frigidaire; R. F. Callaway as branch operations manager of same company.

Mar. 28:

Displays of 1928 lines show definite trend toward color and decorative effects to match household surroundings.

NEWS prints another edition of "Electric Refrigeration Directory."

April. 11:

Move started to organize manufacturers of both electric and gas units for action in pending safety code problem.

Apr. 25:

Machine specifications of compressor units printed in NEWS.

May 9:

Refrigeration Manufacturers Council organized with 31 member companies.

G. W. Mason becomes president of Copeland, succeeding W. R. Wilson, now chairman of board.

May 23:

NEWS announces complete coverage of A. S. R. E. convention in Detroit June 6 and movement of publication to Philadelphia June 20 to report Atlantic City convention of N. E. L. A.

June 6:

Attendance records broken for both A. S. R. E. and N. E. L. A. as electric refrigeration men hear of industry's progress.

NEWS editorial calls upon industry to submit authentic production figures to stabilize business confidence, instead of "puffed" promotion figures.

Kelvinator producing 1,000 units per day in May as compared with 600 per day in April.

NEWS publishes complete "Classified Directory" of unit manufacturers, materials and accessory makers, and allied branches of industry for first time.

June 20:

NEWS editorial states "any serious accident due to failure of equipment on the premises of a customer is a matter of consequence to the entire industry" in discussing safety factors of electric refrigeration.

July 4:

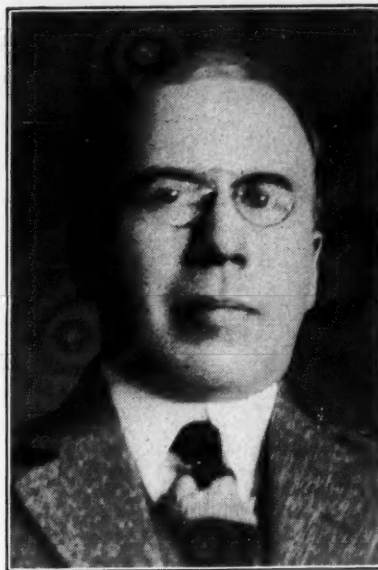
New York Safety Code meeting centers on advisability of using multiple system. Georgian Power Co sales of General Electric models total \$641,000 for period May 4-July 2.

Copeland introduces model with rubber cube tray.

U. S. companies ship 80-85 per cent of units used in France.

Coldak appeals \$19,000 damage verdict to Bridgeport, Conn., superior court after adverse decision in law suit involving injuries sustained by two women from defective apartment house installation.

Banker-Manufacturer



William Robert Wilson alternated between the positions of board chairman and president of the old Copeland organization for a number of years before it was sold.

July 18:

U. S. Shipping Board sends NEWS an inquiry on electric refrigeration as ship-owners consider installations on trans-Atlantic liners.

Aug. 1:

A. H. Goss, president of Kelvinator 1914-1927, resigns as chairman of board.

Aug. 15:

Electrolux, Silca Gel, and other gas machines to be exhibited at American Gas Association convention at Atlantic City, Oct. 8-12.

Aug. 29:

Frigidaire announces three new refrigerator lines comprising 19 models.

Berghoff Properties, Inc., purchase business of Wayne Company, Fort Wayne, Ind.

Holmes Products, Inc., New York, maker of Allison unit, announce new "Holmes" unit.

Appointments: J. A. Corcoran as advertising director for Kelvinator; R. H. Hite as sales promotion manager of Zerozone.

Sept. 12:

Iroquois announces retirement from electric refrigerator business effective Dec. 31, blaming high production costs, low profits for failure.

National Board of Fire Underwriters submits rules for installation of multiple systems.

NEWS publishes data on pioneers in industry.

Manuel Lassen appointed chief engineer of Electro-Kold.

Sept. 26:

NEWS prints several articles relating to gas refrigeration in move to foster friendly competitive spirit between two branches of industry.

Oct. 10:

Cleveland's Dairy Industries Exposition features showing of new commercial refrigeration equipment.

Associated Gas & Electric Company plans to quadruple sales in 1929.

Oct. 24:

Indian Motorcycle Co., Springfield, Mass., announces entrance into electric refrigeration field with limited line.

W. R. Crosett appointed comptroller of Kelvinator.

Nov. 7:

R. R. Thompson, sales manager of Welsbach, urges active trade association within industry to increase sales.

Frigidaire reports 750,000 units shipped from plant since entering field in 1916-250,000 in last eight months.

NEWS takes over entire fifth floor wing of Maccabees Building as offices are expanded.

"Superflex" machine produced by Perfection Stove Co. to bring refrigeration to

Copeland to Kelvinator



George W. Mason left the presidency of Copeland to become president of Kelvinator, a position which he holds today.

country homes. Absorption unit uses kerosene instead of gas or electricity.

W. R. Reynolds appointed advertising manager of Servel.

Nov. 21:

Gibson Refrigerator Co., Greenville, Mich., takes over control of American Refrigerator Co., Peru, Ind.

Dec. 5:

NEWS editorial says dealer must make adequate profit if industry is to prosper.

Dec. 19:

George W. Mason elected chairman of board and general manager of Kelvinator. C. K. Woodbridge continues as president. W. R. Wilson resumes active management of Copeland.

N.E.L.A. Refrigeration Committee proposes "National Refrigeration Week" for May, 1929.

Arthur J. Wood new A.S.R.E. president.

1929

Jan. 2:

NEWS "Directory for 1929" most complete index to all branches of industry ever published.

W. D. Collins appointed chief engineer of Servel.

Jan. 16:

New York Edison changes policy to retail electric refrigeration units.

Wagner Electric Corp., St. Louis, announces new silent, non-radio-interfering repulsion-induction motor.

Third annual report of Kelvinator and subsidiaries shows million-dollar loss for 1928.

Jan. 30:

Four controls manufacturers merge to form Time-O-Stat Controls Co., Elkhart, Ind.

Sales in 1928 reported to have been 468,000 units as compared with 365,000 units in 1927.

Feb. 13:

Cabinet refinements and standardization

(Continued on Page 23, Column 1)

'Salesman Sam'



In the early days of his refrigeration career Vernon E. "Sam" Vining was Servel sales manager.

Advertising Manager



William Reynolds of Servel, Inc., probably is the record-holder among advertising managers in the industry in the point of years of consecutive service.



REFRIGERANT CONTROL VALVES

SIMPLE - POSITIVE - LOW POWER CONSUMPTION

The popular trend toward A-P Controls is but a reflection of the super features that have made them supreme in the field.

Designed to insure against leakage past the valve. Simple and positive in operation against high pressures, and functions perfectly with very low power consumption.

MAIL THE COUPON TODAY

Consult **AUTOMATIC PRODUCTS CO.**
Dept. E3 Milwaukee, Wisconsin

Send complete information on A-P Refrigerant Valves.

NAME
ADDRESS
TOWN STATE

Great Industry Leader



The late G. M. Johnston was president of Universal Cooler Corp. He was well-known for his efforts, while chairman of the Nema division, to promote harmony among the various factors in the industry.

1929

(Continued from Page 22, Column 5) of mechanical details noteworthy as 1929 lines are announced.

Servel shows net profit of \$236,398 in first year of business after reorganization. Frigidaire announces electric room cooler capable of lowering room temperature 10 degrees in half-hour.

Appointments: V. E. Vining as sales manager, F. P. Nehrba as vice-president in charge of engineering and production, E. F. Theis as general production manager, and George L. Roach as Electrolux assistant sales manager, by Servel.

Feb. 27:

Commercial Refrigerator Manufacturers' committee submits scale of recommended temperatures for commercial units as aid to industry.

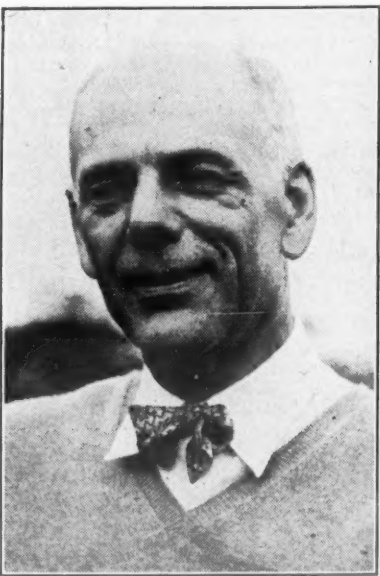
NEWS starts study of refrigerants with article on sulphur dioxide and methyl chloride.

March 13:

Frigidaire first to obtain approval of multiple systems from Underwriters Laboratories, Chicago.

Hussman-Ligonier Co. formed from merger of Hussman, Ligonier, and Steiner

Pace-Setting Distributors



Rex Cole (above) and R. Cooper, Jr. (below) G-E distributors in New York and Chicago, respectively, are perhaps the best-known examples of refrigeration distributors who developed the showmanship side of specialty selling to the highest degree.

companies. John E. Riley president of new firm.

Public confidence in major manufacturers' reliability main reason for acceptance of electrical refrigeration, says NEWS editorial.

Gas company load in New York City increased 100,000,000 cubic feet in 1928 with installation of 5,000 gas units.

NEWS carried advertising of 171 companies in 1928-29.

March 27:

Frigidaire loses patent suit against General Necessities Co. (Absopure) involving basic features of household air-cooled refrigeration unit, March 23.

Louis Ruthenburg appointed president and general manager of Copeland Products.

April 10:

Absopure Refrigeration Corp. formed from merger of Absopure Refrigerator Co., Detroit, and Vogt Refrigerator Co., Louisville, Ky.

Rex Cole, Inc., and R. Cooper, Jr., Inc., General Electric distributors in New York and Chicago, respectively, start \$5,000,000 sales contest.

Complete report of Frigidaire-General Necessities patent trial published by NEWS in 56-page issue for use as record by industry.

Indian Motorcycle begins regular production July 1.

Earl Lines named advertising director for Kelvinator.

April 24:

Twelve companies subscribe total of \$175,000 for advertising program calculated to focus public attention on need for food preservation through use of electric refrigeration.

Refrigeration Manufacturers' Council affiliates with Nema.

Appointments: Harry J. Redwood as vice president and general manager of Absopure; R. G. Nelson as chief engineer of Rice Products, Detroit.

May 8:

NEWS editorial urges uniformity in safety code requirements and elimination of political maneuvers from code discussions in drive to make safety paramount in code structure.

Campbell Wood appointed to direct Kelvinator utility sales.

May 22:

Production plans for 1930 point to output of 1,000,000 units.

Frigidaire machine number 1,000,000 produced at Dayton plant.

Devon Mfg. Co., Springfield, Mass., announces new "Devon" machine using air as refrigerant.

Appointments: J. S. Tritle as vice president in charge of all manufacturing by Westinghouse; C. J. Abbott as works manager of Holmes; Holt Hollinger as advertising director of Leonard.

June 5:

NEWS published at Atlantic City for convention of N.E.L.A.

N.E.L.A. announces \$25,000 prize essay contest on subject of food preservation. Topic: "Why 50 Degrees Is the Danger Point."

David A. Brown, president of General Necessities and Absopure, honored by 2,500 at banquet in New York as he leaves industry to become chairman of the board of newly-organized Broadway National Bank.

Manufacturers attempt to smooth sales curve by intelligent selling during winter months, showing need of constant temperature for preserving food.

June 19:

More than million entrants expected for National Food Preservation Program essay contest. Widespread magazine publicity gets underway.

Right of Philadelphia Electric Co. to sell refrigerators upheld as Merchant & Evans Co. injunction is dismissed, June 7.

Kulair Corporation re-formed in Philadelphia under new plan.

M. S. Sloan, president of New York Edison, asserts company will not cut prices in entering electric refrigeration field.

G. M. Johnston elected president of Universal Cooler.

July 3:

A.S.R.E. Refrigeration Code Committee compromises on new safety code at New York meeting.

July 17:

Engineers of industry present model code to Chicago city council after council proclaims approaching restrictive ban on electrical refrigeration installations.

NEWS again urges industry to cooperate in making all information available for use in perfecting uniform safety code.

July 31:

Chicago safety code committees fail to agree on limit to multiples. Quantity of refrigerant to be used in domestic systems causes deadlock.

Over 250 cities and towns enrolled in food preservation drive.

NEWS editorial commends Chicago officials for action in endeavoring to clear up argument over gas leak accidents.

Appointments: F. A. Merrick as president of Westinghouse; Howard A. Lewis as treasurer of Kelvinator.

Aug. 14:

Chicago city council approves code allowing multiple installations.

Nema protests unfair propaganda from ice industry arising from Chicago situation. Associated Ice Industries' ban on negative publicity fails to prevent dealers from circulating pamphlets.

Kelvinator, General Electric, and Frigidaire launch semi-weekly broadcasts on food preservation.

Foreign Trade Builder



Kelvinator's treasurer, Howard A. Lewis, laid groundwork for expansion in foreign fields.

Aug. 28:

Chicago code situation at standstill as aldermen adjourn until manufacturers cooperate with health commissioner.

Lack of facts for presentation to Chicago council scored by NEWS editorial as showing need for research within industry to establish reliable knowledge of scientific refrigeration principles.

Appointments: Nathaniel Robbins as president of Challenge Refrigerator Co., Grand Haven, Mich.; A. T. Golding as advertising and sales promotion manager of Servel.

Sept. 11:

Norge capital stock acquired by Borg-Warner Corp.

September designated National Food

Preservation Month as 10,000,000 pieces of campaign material are distributed.

Sept. 25:

Fourteen refrigerator companies represented at Canadian National Exhibition, Toronto.

Engineers disagree on two-pound leakage limit proposed by Chicago health commissioner.

Appointments: William S. Race as advertising manager of Copeland; Godfrey Strelinger as manager of branches for Kelvinator.

Oct. 9:

N.E.L.A. to collect data on results of food preservation campaign.

Kelvinator Veteran



Godfrey Strelinger has held many responsible positions with Kelvinator, and is now assistant to the president.

Pioneer Engineer



The late Edward Hughes was a pioneer refrigeration engineer who served Copeland and Norge.

Edward Hughes appointed works manager of Copeland.

Nema refrigeration division considers adoption of uniform warranty for industry.

Oct. 23:

Proposed National Safety Code submitted to A.S.R.E. committee.

Copeland moves factory to Mt. Clemens, Mich.

(Continued on Page 25, Column 1)

Founded
February
1927

10 YEARS

OF SERVICE TO YOUR INDUSTRY

To the Manufacturers, Distributors, Engineers and Service Organizations that have made Possible

The Growth and Success of

THE UTILITIES ENGINEERING INSTITUTE —

We Extend Our Thanks

Since 1927, when the Electric Refrigeration Industry first became a factor in American Business, Utilities Engineering Institute has filled a unique and enviable position in its relation to the industry.

Utilities Engineering Institute was the first to engage exclusively on a national scale in the business of training men in Electric Refrigeration.

From the very first we were fully conscious of our obligation to the Electric Refrigeration Industry. From the very beginning we recognized that, in order to best serve the Industry and our students, it was necessary to train them as you men in the Industry want them trained.

Therefore, our method of training has been unique. U. E. I. students have been selected. Not every man who wants to enroll for U. E. I. training can do so. We pick men who, in our judgment, are best qualified to succeed. Then we give them complete and actual experience in every phase of Electric Refrigeration work. As a result, U. E. I. students STAND OUT when they enter the Electric Refrigeration field.

Because of our unique method of training men, we believe U. E. I. has rendered service of inestimable value to Manufacturers, Distributors, Engineers and Service and Installation Organizations. The cooperation given to the U. E. I. by the Industry as a whole has been largely instrumental in making this service possible, and in appreciation of this cooperation, the U. E. I. extends its sincere thanks to executives throughout the Industry and pledges a continuation of the same faithful, efficient and helpful service that it has rendered in the past.

Do you need a man for Shop, Installation, Service or Sales work?
The U. E. I. Placement Service can recommend a man to fill the position.
We have men available in all parts of the country. Let us serve you.

UTILITIES ENGINEERING INSTITUTE

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VOL. 19, No. 2, SERIAL No. 390
SEPTEMBER 9, 1936
TENTH ANNIVERSARY NUMBER

What It Means to Have the Confidence Of Subscribers

TEN YEARS AGO this week (Sept. 11, 1926) the first issue of ELECTRIC REFRIGERATION NEWS was distributed at a cooperative meeting of electric refrigeration manufacturing organizations held at the Waldenwoods estate of J. Robert Crouse, near Detroit, Mich.

The new paper for the new industry was sprung as a surprise at this meeting. Mr. Crouse, the host of Waldenwoods, had given his personal consent to the distribution of the papers, but the NEWS did not enter the field with any official sponsorship.

Thus ELECTRIC REFRIGERATION NEWS made its bid for recognition by the industry entirely on its own merits and without the benefit of advance approval by the manufacturing interests.

Furthermore, the cooperative activity, which had started so auspiciously the previous year, went on the rocks at the very meeting at which the NEWS was launched. Shortly thereafter the industry entered upon its first period of "depression." A number of new companies, which had been recently launched, encountered difficulties and were forced to make drastic revisions in their ambitious programs.

Hence the NEWS embarked upon its career of service to the industry under rather discouraging conditions. Instead of receiving active assistance from a friendly and apparently well-organized industry, the NEWS was left to find its way alone in a turbulent field.

This bit of history is related here because it should be considered significant in any effort to appraise the present editorial policy of the NEWS, and its working relations with certain dominant factors in the industry.

Those who have become acquainted with the NEWS in more recent years often express surprise that some of the editorial policies do not seem to be in accord with the usual practices of trade papers. We are frequently called upon to explain, for example, why the NEWS does not rush to the defense of the industry every time a critic questions its practices; why it does not agonize in the customary trade paper manner over the ills of the industry; and why it does not blow the trumpets and beat the drums for the advertiser, according to widespread trade paper practice.

Probably the most logical answer to these questions is that the NEWS has had the somewhat unusual experience of winning recognition from its subscribers long before it accumulated any considerable volume of business from its advertisers.

From the beginning, therefore, the NEWS has looked to the subscriber, rather than the advertiser, as the paramount influence in determining its editorial policies.

During the past 10 years the NEWS has seen many refrigeration manufacturers rise and fall. Presidents, chief engineers, sales and advertising managers (and their advertising agencies) have come and gone. But a backlog of subscribers has remained steadily and steadfast and it is with this more or less permanent portion of the industry that the NEWS has tried to keep faith.

In brief, the NEWS has often had little assurance of the continuation of its advertising revenue but through all the trials and tribulations it has enjoyed the confidence of a large group of subscribers whose unwavering loyalty has given the NEWS courage to maintain its standards of service through good times and bad.

On many occasions the NEWS has been subjected to attack, both direct and subversive, from individuals, companies, and powerful organized groups. Invariably it has developed that such opposition has been motivated by a desire to get the editorial policy of the paper under control.

The complaint has not been that the editorial service of the NEWS was untrustworthy or inadequate. On the contrary, manufacturers have often complained that too much was printed, that too much was revealed. Hence they have sought to muzzle the paper or exercise some form of censorship.

The NEWS has resisted all efforts in this direction, even in the face of threats of extinction, because of its unbounded faith in its subscribers.

What this means from the publishing viewpoint is simply this: the confidence of subscribers is something which a publication must win by its own efforts. No amount of advertising "support" will supply that priceless ingredient. The confidence of subscribers is something which a publication can lose easily enough if it fails to keep the faith, but once that confidence is established, it is extremely difficult for any outside influence to destroy it.

In addition to these considerations the NEWS has had the satisfaction of living long enough to see many of its editorial activities justified in the light of later experience. A notable example involves the famous refrigerant safety code hearings in Chicago during the summer of 1929. Those hearings were reported in complete detail in spite of practically unanimous opposition and concerted efforts to prevent that "unfavorable publicity."

Looking back upon the situation now it is entirely obvious, even to the bitterest opponents of that policy during that period, that the best interests of the industry were served by the widespread dissemination of the factual data and other information disclosed by the testimony.

But even now, after 10 years of consistent adherence to a well-defined program, during which time no competitive publication has challenged successfully the place or prestige of the NEWS, it still meets with occasional aggressive opposition from the same organizations to which it has rendered service so freely and fully.

After 10 years of such experience the NEWS has become reconciled to the conclusion that this unhappy conflict is more or less inevitable. The differences in viewpoint seem to be inherent in a situation where aggressive sales organizations seek to control every factor affecting the distribution of their product. Being highly sensitive to the possibilities of all forms of publicity, they view with suspicion any independent medium for the distribution of information.

Because of this natural desire to maintain control of the distribution of information, most of the large manufacturers have become active publishers themselves. Their elaborate house organs have been the chief competition of the NEWS, and since these company publications are distributed free, it has been up to the NEWS to deliver unusual value in order to attract paid subscriptions.

That problem has been effectively solved by giving the subscriber information which he cannot get from the publications of manufacturers and suppliers. Readers have learned that they can believe what they read in the NEWS. They have learned to expect to see it in the NEWS first.

Looking back over the last 10 years the NEWS is proud of its record of editorial service, proud of its independence, proud of its unique and unchallenged position in the industry, and proud of the almost unprecedented loyalty of its subscribers.

We believe that the NEWS, as well as the industry, is on the verge of great things, but come prosperity or decadence, hell or high water, the NEWS will continue to keep faith with its subscribers.

Letters

He Paid in Advance for a 10-Year Subscription

Publisher's Note: Back in 1927, soon after the NEWS was started, and when the subscription price was only \$1.00 per year, W. L. Cummings sent in \$10.00 for a 10-year subscription.

Mr. Cummings is still getting the NEWS on his original order and from the following letter, it appears that he is well satisfied with his bargain.

On this, our Tenth Anniversary, we salute Mr. Cummings as the subscriber who had the greatest faith in the future of the NEWS.

W. L. Cummings & Co.
Manufacturers' Agent
Room 903, 40 Court St.
Boston, Mass.

May 5, 1936

Mr. Cockrell:

May I thank you for your letter of May 1. It is always a gratification to see a concern alive to such matters as these.

I might say that the 10 year subscription to the ELECTRIC REFRIGERATION NEWS was always a source of satisfaction to me, and that I have never regretted having made the purchase. Back in 1927, the business was young and growing with tremendous speed. It was clear to me that the trade paper of the industry would grow with equal speed, and that its value would soon justify a high rate of annual subscription. I also knew that I would be in the business for many years. It was only natural that I should step up and ask for the long term subscription, as a result of these two thoughts.

I have read the paper steadily all these years. It has recorded with interesting pains, the ups and downs of this modern business. Being a Commercial man, I have read with interest the technical reports, and have found a great majority of them to be fair, correct as far as they have gone, and most helpful to the thought of the selling man. There is enough of generalities, and "big" news to hold the executives, and officials, and there is also a run of every-day news to inspire the thousands of men who do not figure in the big negotiations behind the business. The advertisements are a vital part of the value of the sheet. These advertisements bring the latest information, the new

units, and the modern thinking right to the selling and engineering man from the very moment such material is ready for general use.

After 10 years with Frigidaire in New England, I withdrew last November to take up a business opportunity which I could not well overlook. I shall be involved in this enterprise for some time to come, but I do not really consider that I am out of the refrigeration business. I shall probably be back in it before long. In the meantime, the ELECTRIC REFRIGERATION NEWS is my weekly contact with trade happenings, and it serves me well.

I might summarize my feelings and statements by asking you if you would care to sell me another 10 years subscription to the NEWS for another \$10.00? Your reply will be awaited with interest, by

WM. LEVERETT CUMMINGS

How Many Others Would Like Such a Book?

Curtis Refrigerating Machine Co.
St. Louis, Mo.

Aug. 31, 1936

Advertising Manager:

We appreciate your letter of the 27th, enclosing the issue of George Taubeneck's writeup on Bombay. The article in question undoubtedly has been read carefully by our Sales Manager, Mr. Morrison, as we are sure he is following these articles of George's, as is the writer.

The writer has meant to suggest several times, but suppose you have received similar suggestions from many sources, that this series of articles by George Taubeneck be compiled in book form. They will be not only valuable as data on foreign distribution but they are highly interesting as a travelogue.

L. C. BLAKE,
Advertising Manager

Accurate Description of Conditions in Egypt

Gregorakis & Co.
Distributor for Frigidaire, Buick, and
Delco Products
17 Rue Kasr El Nil
Cairo, Egypt

Aug. 27, 1936

Editor:

I wish to congratulate you on the very excellent and accurate manner you described conditions and the refrigeration business in this country. You have covered the whole subject thoroughly.

I shall be obliged if you would kindly post us immediately on receipt of this letter three copies of the August 5 issue. Kindly let me know the cost of same and I will immediately mail you a cheque.

Should you be in need of anything in this country do not hesitate to write to me. I shall only be too delighted to be of any service to you.

J. E. BENGHIAT,
Refrigeration Manager.

War or No War, He Must Have the News

Anonima Rifa Anglada
Frigidaire
Paseo de Gracia, 23, Barcelona
Avenida de Eduardo, Madrid
July 17, 1936.

Gentlemen:

No finding the possibility to obtain the check of three dollars to renew our subscription to ELECTRIC REFRIGERATION NEWS, by the normal way, we charge one of our friends in Cuba to send you this amount in order to follow our subscription.

From many months ago we asked by the enterprise of our Bank this amount to the "Centro de Contratacion de Moneda." No having information about and wanting the informations of your publication we had taken the decision above exposed.

J. FARRE, Apoderado

Answer: We greatly appreciate your keen interest in the NEWS, especially considering the great difficulties under which you are working at the present time.

British Government Wants Facts About Dry Ice

British Consulate
601 First National Bank Bldg.
Detroit, Mich.

Sept. 5, 1936.

Dear Sir:

The British army in India is considering a scheme for the provision of frozen meat to the troops in India, which will include the provision of a modern abattoir, a series of cold storage depots at focal points and a system of refrigerated rail and road transport. It is proposed that the cold storage depots and the refrigerated transport facilities shall be available for commercial as well as military use, and thus it is visualized that many other perishable commodities such as fish, fruit, vegetables, dairy produce will require to be handled in addition to meat.

The question of the type of refrigerant to be used in transportation

vehicles by rail and road has shortly to be considered, and to enable a decision to be arrived at it is very desirable to compare to the fullest possible extent the respective advantages of dry ice and mechanical refrigeration.

The refrigeration industry is still in its infancy in India, and although much information has been obtained from England it appears to be highly desirable to supplement it with the fullest possible data from America, where climatic conditions at certain times of the year and general conditions are more nearly parallel to conditions in India.

It would be very much appreciated therefore if you could furnish some data as to the use of dry ice in America, and it is suggested that if you are willing to assist with the information required you may possibly be able to supply useful facts on the following lines:

(a) Uses for which dry ice has been popularly adopted by commerce in the United States, with statistics.

(b) Extent of use of dry ice for refrigerated transport both by rail and road, nature of loads, distances, and temperatures.

(c) Extent to which dry ice has or has not replaced mechanical refrigeration.

(d) Comparison of costs with costs of mechanical refrigeration for rail and road transport.

(e) Extent to which temperatures can be reliably controlled.

Any additional information or statistics you may be able to furnish would be very much appreciated.

L. C. HUGHES-HALLETT,
H.B.M. Consul.

Editor's Note: In the July 22 issue of the NEWS, Editor George F. Taubeneck discusses (in his "Around the World" travelogue) the refrigeration problems and needs of the British army in India, and tells why quick-frozen foods would be a great boon to white soldiers in this land of extreme heat and superstition.

Who Got the Business In Sioux City?

D. K. Baxter, Inc.
Distributors
Frigidaire and Superflex Refrigeration
896 Pierce St., Sioux City, Iowa
Sept. 4, 1936.

Gentlemen:

On the front page of your issue of Aug. 26, you have an article headed "\$80,000 Worth of Conditioning Sold in City of 80,000."

In the name of truth and accuracy we would like to make a correction to the information you have published here as it is so grossly exaggerated. The local utility, and Sioux City Gas & Electric Co., have just given us a list of all the refrigerated air-conditioning installations made in Sioux City so far this year and they total 215 tons which at an average price of \$250.00 a ton totals \$53,750.00, and of this amount Carrier instead of receiving three-quarters, as your article indicates, sold 35 tons totaling about \$8,750.00 at \$250.00 a ton.

As we are direct factory distributors for Frigidaire we are naturally interested in the leadership of our product and analyzing the installations one-by-one we have a total of Frigidaire tonnage sold this year of 57½. The rest of the installations were divided between General Electric, York, Westinghouse, and a few nondescript and second-hand installations.

D. K. BAXTER,
President.

World-Wide Reputation For Impartiality

H. Alan Harms
41 Pennant St.

North Perth, Western Australia
I desire to thank you for your letter of March 24 and wish to advise having received the MASTER SERVICE MANUAL which I consider a valuable contribution to my library.

As requested I am herewith forwarding Australian Money order No. 16531 payable at Detroit, Mich. Please post me Vols 1 & 2 of your refrigeration library.

In the near future I will send you my remittance for Vols 4 & 5.

I would also appreciate having my name placed on your catalogue mailing system.

I have read advertisements in "ERN" run by Peno Service Co., Ft. Smith, Ark., relative to instructions on servicing of G-E hermetics, and would appreciate any information you may be able to offer, either through the columns of your paper or by letter, as to the reliability of any instructions that this concern may sell.

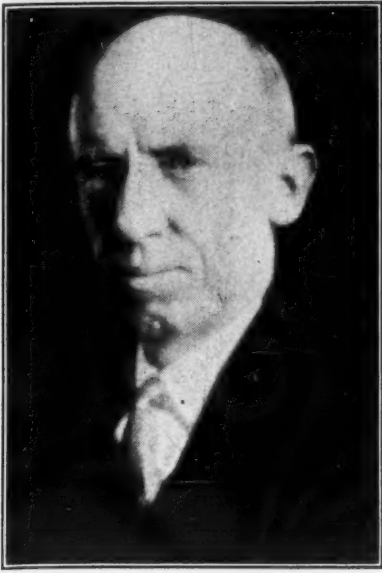
Your editorial relative to Scare Advertising certainly is in the right direction and cannot fail to enhance your world wide reputation as a very, very impartial publisher.

I thank you for your past kindnesses and anticipate your assistance in the future.

H. ALAN HARMS

Answer: Comments of readers on the service instructions sold by Peno Service Co., are invited by the editor.

Headed Majestic Operation



B. J. Grigsby was one of the founders and chairman of the board of the now defunct Grigsby-Grunow Co., which brought out the "Majestic" refrigerator in 1930.

1929

(Continued from Page 23, Column 5)

Norge builds new Detroit factory.
Appointments: J. S. Sayre as sales manager of Kelvinator; H. S. Boyle as sales promotion manager of Electrolux; C. E. Colyer as export manager of Servel.

Nov. 6:

Sunbeam Electric Manufacturing Co., Detroit, to begin manufacture of "Sunbeam" machine Jan. 1.

Hussman-Ligonier acquires Gruendler refrigerator cabinet firm.

NEWS publishes "Refrigerator Serviceman's Trouble Finder" as aid in discovering causes of service calls.

Nov. 20:

Kelvinator offers 12 new models in 1930 line.

Quick-freezing viewed as progressive innovation in meat-packing industry.

Appointments: H. M. Stewart as general manager of McCray; George J. Gaffney as sales manager of Jewett.

Dec. 4:

Frank E. Smith, Servel president, sees no harm to electric refrigeration industry caused by Wall Street crash.

Kelvinator profits for year over \$1,000,000.

NEWS editorial views 1930 as "test" year for industry as companies prepare to combat sales resistance caused by depression.

Dec. 18:

Directory of 83 manufacturers of complete units published in NEWS.

Leonard's plant expansion at Grand Rapids costs \$350,000.

Appointments: August H. Jaeger as first vice president of Leonard.

1930

Jan. 1:

Westinghouse hermetically sealed machine goes on market Feb. 1.

Heads of seventeen electric refrigeration manufacturing companies voice confidence in industry's stability in reply to NEWS questionnaire.

Jan. 15:

Holmes company liquidates stock and abandons business.

Hiram M. Browne appointed general manager of Absopure.

Jan. 29:

William C. Grunow, vice president of Grigsby-Grunow, states company ready to enter electric refrigeration field.

Advertising Director



A. M. Taylor was first the advertising director of Copeland, then of Kelvinator. He was later with the Leonard, and Potter organizations.

Hydrator introduced by Frigidaire in 1930 line.

Water cooling featured by NEWS in this issue.

Feb. 12:

Welsbach introduces models using separate coil for freezing cubes.

White House Executive Building gets air-conditioning system.

Feb. 26:

American Foundry Equipment Co. enters field with "American Ace," completely enclosed commercial condensing unit.

Grigsby-Grunow erecting new plant for production of "Majestic" unit; production forecast for May.

March 12:

N.E.L.A. Refrigeration Committee prepares for 1930 food safety drive; "50 Degree" safety plan to be continued.

First extensive test of quick frozen foods made in 10 Springfield, Mass. stores, attracting widespread public attention.

March 26:

Chicago Health Committee renews hearings on safety principles of electric refrigeration March 14.

Norge introduces Rollator principle in new line.

NEWS publishes first of series of "Refrigerated Foods" sections.

Appointments: E. S. Matthews as president of Electric-Kold; John R. Replogle as chief engineer of Copeland.

Pioneer Sales Executive



In 1930 J. A. Harlan was elected vice president in charge of sales for Frigidaire. He now heads Kelvinator's commercial refrigeration sales department.

April 9:

Sales during first quarter of 1930 presage 1,000,000-unit production during year. All manufacturers report big sales gains in first year of depression.

At time when other industries are content to hold their own, electric refrigeration is making new gains, states NEWS editorial. Attention drawn to fact that quotas now being exceeded were formulated in October, 1929, before Wall Street market crash.

April 23:

Majestic Household Utilities Corp. is formed April 4. B. J. Grigsby named chairman of board; William C. Grunow, president.

Frigidaire spring selling campaign in 2,550 newspapers gets underway with expenditure of \$1,000,000 in ten weeks.

Ralph Douglass named director of advertising and sales promotion for Copeland.

May 7:

A.S.R.E. annual convention opens in Atlanta, Ga.

Standard Safety Code for Mechanical Refrigeration, work of several years, finally ready for presentation to American Standards Association. Complete text presented in NEWS.

"Starr Freeze" unit produced by Starr Piano Co., Richmond, Ind.

Peerless Ice Machine Co., Chicago, places air-cooling device for average-sized stores on market.

May 21:

U. S. Bureau of Mines tests Midegeley refrigerant (dichlorodifluoromethane). Product claimed to be non-inflammable and non-toxic.

Omaha and New Haven pass safety codes allowing multiple installations.

June 4:

Australia places 90 per cent ad valorem tariff on American-made refrigerators.

May Kelvinator shipments greatest in company's history.

Appointments: J. A. Harlan as vice president in charge of sales of Frigidaire, and E. R. Godfrey as vice president in charge of production; Leonard Serdiuk as advertising director for Peerless.

June 18:

Electric refrigeration called major load builder for utilities at 53rd annual N.E.L.A. convention, San Francisco.

Appointments: W. J. Carlyle as president of Absopure; Arthur W. Clark as sales director of Wayne; W. C. Rowles as general sales manager of American Ace; Edward B. Newill as vice president in charge of engineering by Frigidaire.

July 2:

Westinghouse opens up new eastern and southern sales territories.

American Medical Association approves electric refrigeration and refrigerants at convention in Detroit, June 23-27.

July 16:

Sales for first half year above same period in 1929.

"Cadillac" machine produced by Central Machine Co., Detroit.

Many Years in Field



W. Paul Jones started his career in refrigeration as a Frigidaire distributor, later joining Servel's factory staff, where he became advertising manager. He is now general manager of Fairbanks-Morse appliance division.

July 30:

Refrigerator rental plan used successfully by store in Johnstown, Pa.

Leaders of industry congratulate NEWS publisher in 100th issue.

NEWS publishes first "Buyer's Guide" section, featuring appliances.

Aug. 13:

Joint Committee of ice and refrigeration leaders formed to eliminate undesirable advertising and publicity in both industries.

Albert M. Taylor appointed advertising director of Kelvinator.

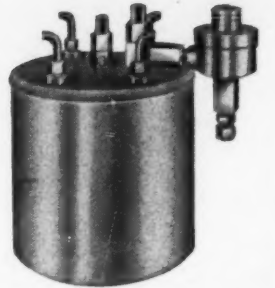
Aug. 27:

Profitable business during first six months of 1930.

(Continued on Page 25, Column 1)

They Stood The Test

The Grilling heat of the summer just passed served only to emphasize the superiority of Temprite coolers. Temprite users were not "caught short" when the temperature soared.



The hot weather has gone but its lesson remains:

Install Temprite and protect your customers' interests.



There is no substitute for Temprite!

TEMPRITE PRODUCTS CORPORATION
1349 EAST MILWAUKEE AVE. - DETROIT, MICHIGAN
ORIGINATORS OF INSTANTANEOUS LIQUID COOLING DEVICES

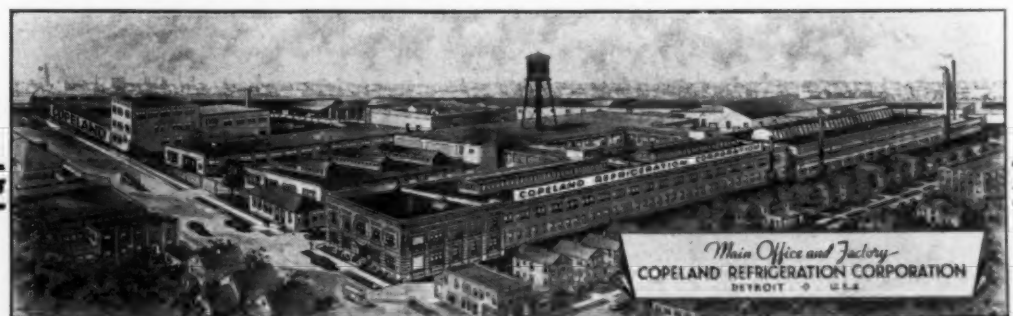
1917-1936 COPELAND

A DOMINANT FACTOR in the
ELECTRIC REFRIGERATION INDUSTRY
Since the Beginning

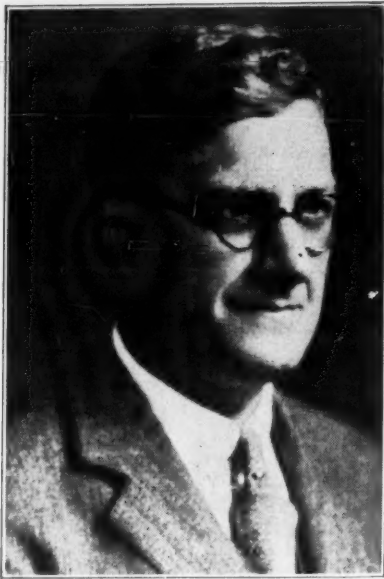
● MANY years ago, Copeland introduced the first successful automatic electric refrigerator. We are justly proud of that honor. Since that memorable beginning, Copeland has pledged its talents, experience and resources to the development and continued advancement of dependable electric refrigeration. To that end, the modern Copeland Refrigerating Units are produced by precision-manufacturing methods according to standards considered to be the highest prevailing in the industry.

COPELAND REFRIGERATION CORPORATION

Manufacturers of a Complete Line of Household and Commercial Refrigeration
Holden Avenue at Lincoln . . . DETROIT, MICHIGAN



Manufacturing Chief



G. M. Evans has been vice president in charge of manufacturing for Kelvinator since late in 1930.

1930

(Continued from Page 25, Column 5) months of year reported by 76 of 80 distributors attending annual convention of General Electric men at Association Island, N. Y.

W. Paul Jones appointed advertising manager of Servel.

Sept. 10:

Kelvinator and Frigidaire announce models in low-price field.

National Society of Refrigeration Service Engineers formed by group of service men in Buffalo, N. Y.

Sept. 24:

Two more "under \$150" machines enter field: "Apex," by Apex Electrical Mfg. Co., Cleveland; and "Dayton," by Dayton Refrigeration Co., Dayton, Ohio.

Majestic starts 1,000-unit per day production schedule.

Oct. 8:

Grigsby-Grunow starts Majestic line production of models at \$175 and \$195. NEWS editorial questions advisability of tendencies in industry toward price-cutting and misleading f. o. b. prices; calls for stable advertised price.

Oct. 22:

N.E.L.A. launches three-year \$5,000,000 advertising-publicity-promotion program; plan to put 1,000,000 domestic units in service during 1931.

Frigidaire and General Motors Radio announce sales alliance: plan to aid dealers in overcoming seasonal slacks.

Commerce Yearbook for 1930 shows 1,800,000 domestic units in use—one to every nine families—and exports showing seven-fold gain since 1923.

Leonard Refrigerator Co. starts production of electric model.

Nov. 5:

Merger of Carrier, Brunswick-Kroeschell, and York of Philadelphia units air-conditioning, refrigerating, and unit heating firms into \$15,000,000 group.

American Standards Association finally adopts Safety Code for Mechanical Refrigeration, Oct. 29.

"King Kold" machine placed on market by Illinois Moulding Co., Chicago.

G. M. Evans appointed vice-president in charge of manufacturing by Kelvinator.

Dec. 3:

Westinghouse opens intensive distribution drive in all sections of country east of Kansas City.

Dec. 17:

"Mayflower" machine produced by Trupar Mfg. Co., Dayton.

A.S.R.E. convention in New York attended by 540.

Dec. 31:

Chicago refrigeration ordinance, bone of contention since July, 1929, passed by city council; provides regulation of design, construction, installation, and inspection of refrigerating systems.

1931

Jan. 14:

Cooperation within industry and progress of "package merchandising" main notes of thought as company heads view new year.

Safety code of industry to be sent to all towns of over 30,000 by A.S.R.E. to aid formation of local codes.

Kulair moves plant to Richmond, Ind.

Designer of Machines



John Replogle was one of the refrigeration engineers who pioneered in the design of the small household unit. He was with Nizer and later joined the Copeland company.

NEWS estimates wired home market 14.7% saturated: shows sales growth from 10,000 units in 1920 to 770,000 in 1930. "Buyer's Guide" section contains first statistical survey of industry.

Appointments: T. K. Quinn as vice president of General Electric, and P. B. Zimmerman as manager of electric refrigeration department.

Jan. 28:

B. J. Grigsby takes full control of Grigsby-Grunow and Majestic; William C. Grunow leaves firm; Vernon W. Collamore in charge of radio and refrigeration sales.

Louis Ruthenburg, Copeland president, elected president of Nema Refrigeration Division.

Feb. 11:

A. E. Stacy, Carrier engineer, tells Midwest Power Engineering conference air-conditioning ready for home installation.

Gibson Refrigerator Co., Greenville, Mich., enters field with three-model line. Servel introduces 15-model commercial line.

Kelvinator announces \$332,600 net loss for first quarter of year.

C. W. Hadden appointed Copeland sales manager.

Feb. 25:

Absopure, in receivership, completely reorganized.

Zerozone receivership in hands of Straus National Bank, Chicago.

"Sanitary" machine produced by Sanitary Mfg. Co., Fond du Lac, Wis.

Coin-operated machine placed on market by Automatic Refrigerator Corp., Chicago.

Exports during 1930 reported off, while refrigerator shipments gain.

March 11:

Frigidaire and General Electric announce three-year guarantees on cabinets and units.

William C. Grunow forms own radio-electric refrigerator manufacturing firm.

Starr Company, Richmond, Ind., buys out Polar Wave and Benedict Yukon firms.

Grigsby-Grunow absorbs Majestic Household Utilities Corp., March 1.

Rice in receivership.

NEWS presents first "Engineering Section" printed on green paper.

March 25:

Oklahoma and Kansas prohibit merchandising by public utilities; central stations prepare to fight bills, claiming political influence.

Canada Norge Corp. formed in Toronto.

Frigidaire production at 1,800-per-day mark.

Appointments: M. W. Kenny as chief engineer of Grunow, and James J. Davin as advertising and sales promotion manager.

April 8:

"Coldspot," manufactured by Sunbeam Electric Mfg. Co., Evansville, Ind., make debut as Sears Roebuck & Co. retail line.

Kelvinator and Majestic announce three-year guarantees.

California, Nebraska, and Indiana kill anti-utilities merchandising bills in legislatures.

First air-conditioning supplement published by NEWS.

April 22:

Anti-utility-selling measure dies in Missouri legislature.

New York syndicate takes over Zerozone.

Williams adopts three-year guarantee.

May 6:

Servel, General Electric, Copeland, Leonard, and Kelvinator hit sales peaks.

Universal Cooler purchases Absopure.

Starr raises guarantee ante to three and one-half years. Mayflower offers three-year warranty.

"Mohawk" electric refrigerator announced by American Mohawk Company, North Tonawanda, N. Y.

Depression has had relatively small effect on electric refrigerator installment selling, says NEWS editorial.

May 20:

Los Angeles firm sells machines on 25-cents-a-day plan.

NEWS estimates 100 large distributing organizations accounting for 50% of sales, and maximum of 500 distributors doing 85% of the total business.

June 3:

"Invest In An Electric Refrigerator" keynote of three-year nation-wide educational campaign in 8,500 communities, sponsored by Electric Refrigeration Bureau of N.E.L.A.

John R. Replogle and Edward Hughes named vice presidents of Copeland.

June 17:

Utilities leaders protest government interference in merchandising field at 54th convention of N.E.L.A., Atlantic City, June 8-12.

Nema begins collection of statistics on industry from 1928 on.

July 1:

Frigidaire and Norge begin nation-wide sales contests.

John E. Starr, first A.S.R.E. president and veteran refrigeration engineer, dies at 75, June 27.

July 15:

Kelvinator starts \$250,000 sales promotion contest.

Appointments: R. I. Petrie sales manager of Leonard; R. C. Roling as production manager, and R. C. Haimbaugh as chief engineer of Majestic.

July 29:

Westinghouse, Copeland, and Servel institute sales contests.

NEWS announces change from every-other-week to weekly publication beginning Sept. 9. "Refrigerated Foods" section to become separate publication Sept. 1.

Trucks with complete electric refrigeration equipment gaining favor with packers and ice cream manufacturers.

Truman P. Gaylord, vice president of Westinghouse, dies at 60.

M. C. Terry appointed chief refrigeration engineer of Westinghouse.

Frigidaire and General Iron Works Co., Cincinnati, bring out "Hot-Kold" domestic air-conditioning apparatus, providing year-around circulation of fresh air in homes.

Servel Sales Director



Following the appointment in 1931 of F. E. Sellman as vice president in charge of sales for Servel, sales of the Electrolux gas refrigerator have made rapid strides in the United States.

Aug. 12:

Auto-Lite buys out Whitehead; National Pumps purchases Dayton.

"Lectrik-Ice" machine produced by Uniflow Mfg. Co., Erie, Pa.

Two B. & O. trains air-conditioned with York Equipment.

Aug. 26:

Kelvinator markets new room cooler with remote compressor. R. R. Davis appointed advertising director of Westinghouse. Early fall sales indicate year's unit quota will reach 1,000,000.

Sept. 9:

NEWS appears as weekly publication five years after founding.

Frigidaire cuts prices on domestic and commercial lines.

Kelvinator takes on "Torid-heat" oil-burner line.

Baker absorbs Icelect company.

Carrier announces gasless refrigeration air conditioning for trains, utilizing steam from engine as refrigerating energy and water as sole refrigerant.

Sept. 16:

Montgomery Ward follows Sears Roebuck lead, marketing "Tru-Kold."

Sept. 23:

Louis Ruthenburg elected president of Nema Refrigeration Division for second term.

"Manufactured weather" getting attention of industry and public alike.

Sept. 30:

Apex-Wayne manufacturing operations moved to Painesville, Ohio.

Bohn door patents held invalid in suit with Seeger.

Appointments: F. E. Sellman as vice president in charge of sales of Servel; C. W. Coyne as sales manager of Gibson.

Oct. 7:

Kelvinator retires "Gold Note" 6% issue at 105 as company doubles cash on hand, retires funded debt, and adds \$1,500,000 in working capital.

King Kold offers three-year warranty at sales convention, Chicago.

Oct. 14:

General Electric launches million-dollar radio program series.

Copeland, Westinghouse, and Kelvinator salesmen get cash prizes after successful sales drives.

NEWS editorial discusses values of user as selling intermediary.

Oct. 21:

Norge purchases Alaska cabinet sub-

(Continued on Page 27, Column 1)

Leonard Veteran



R. I. Petrie has been identified with Leonard almost since that company started to produce an electric refrigerator. He is sales manager.

COPPER TUBING

UNIFORM SOFT-TEMPER
MAXIMUM STRENGTH
UNIFORM WALL THICKNESS
SMOOTH MIRROR-LIKE SURFACES
FOR ALL REFRIGERATION WORK

WOLVERINE TUBE CO.
SEAMLESS COPPER BRASS & ALUMINUM
1411 Central Ave. Detroit, Michigan

Advanced by Westinghouse



Ray Cosgrove didn't hold his job long as sales promotion manager of the Westinghouse refrigeration division, because he was soon made sales manager of the division.

1931

(Continued from Page 26, Column 5)
sidiary and plans 1932 expansion; Electro-lux and Trupar pushing sales expansion for new year.

Gas-operated silica gel air conditioning explained at A.G.A. conclave in Atlantic City.

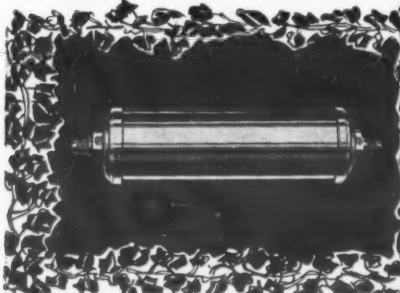
Oct. 28:

Seven new Leonards, featuring pedal door-opener, introduced.

Wired-home market only 20% saturated, NEWS estimates.

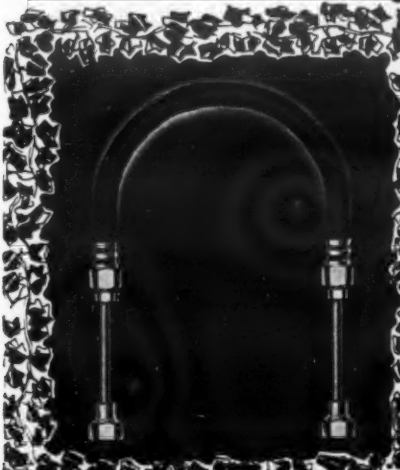


Profitable in two ways are Weatherhead Refrigeration Parts. Ease of installation, perfection of design, accuracy of workmanship—and a greater value that is so apparent when other parts are compared with Weatherhead Original Equipment.



Moisture removers is just another name for Weatherhead Dehydrators. Available in small size for permanent installation, and large size for service.

Filters for straining as only Weatherhead knows how to make them. Constantly practical for catching all refuse.



The refrigeration industry needed a flexible Charging Hose which would stand up under all refrigerants in use today. Weatherhead created that hose—a product of modern chemistry. Available in complete range of sizes and lengths. Six inches of copper tube at each end which may be replaced as often as necessary.

WEATHERHEAD

Nov. 4:
Electric Refrigeration Bureau calls for another million sales in 1932. Advertising budget set at \$412,000.

Westinghouse starts manufacturing own cabinets at Mansfield, Ohio, plant.

Nov. 11:

Appointments: W. R. Marshall as sales promotion manager, and F. A. Delano as sales manager of Gibson.

Nov. 18:

Gilfillan machine makes appearance on Pacific coast.

Kelvinator introduces constant speed drive for machines in refrigerated trucks.

Nov. 25:

Iceberg's creditors asked to accept 20% settlement to stave off firm's bankruptcy.

Kelvinator pays \$1.53 dividend; profits 10 per cent above 1930.

Dec. 2:

NEWS renews plea for statistical information from manufacturers, pointing to desire of distributors to know facts before they seek franchises.

Universal Cooler moves production into old Nizer factory, Detroit.

Dec. 9:

Frigidaire initiates \$6,000 prize essay contest for Christmas season.

Official government recognition of household refrigeration made in 48-page report to President Hoover's Conference on Home Building and Home Ownership.

Appointments: A. A. Uhalt as manager of dealer division for General Electric; Fred G. Hulbard to sales promotion staff of Kelvinator.

Dec. 16:

Majestic electric refrigerator and radio lines now sold by separate divisions of Grigsby-Grunow.

"Buckeye" machine, made by Domestic Industries, Inc., Mansfield, Ohio, makes appearance on market.

E. E. McMullen, Norge vice president, dies Dec. 3 in St. Louis.

Little dumping done in electric refrigerator retailing, say NEWS editorial, due to live-wire selling organizations in field.

B. F. Sturtevant Co., Hyde Park, Mass., purchases control of Cooling and Air Conditioning Corp.

Dec. 23:

Leading manufacturers cooperate with NEWS in compiling statistics on distribution for "1932 Refrigeration Directory," first published data book of industry.

Dec. 30:

Sparton adds electric refrigerators to radio line.

Copeland profits \$6.04 per share; sales up 19%.

NEWS editorial comments on change of electric refrigerator from companion merchandise product to first-line seller in retail stores.

New S. S. Mariposa, equator-crossing liner, air conditions dining rooms.

Scientific data on F-12 (dichlorodifluoromethane) published in NEWS after tests made at Deepwater, N. J., for Kinetic Chemicals.

1932

Jan. 6:

Sparton presents three-model line to dealers.

A. C. Mayer, General Electric merchandising manager, killed in plane crash.

Appointments: C. B. Graves as refrigeration division manager of Westinghouse; Chester H. Lang as publicity director of General Electric.

Up from the Ranks



H. W. Newell went through successive stages in the Frigidaire organization from retail salesman to vice president before leaving the firm to enter the advertising agency business.

Majestic to S-W



John Ditzell, veteran Majestic executive, now heads refrigeration and radio selling for Stewart-Warner.

Jan. 13:

General Electric announces "conditioned air" display cases in commercial line, using forced air circulation over evaporator.

Norge sales up 460% in 1931.

Carrier air conditions A.T.&S.F. transcontinental trains.

Jan. 20:

General Motors introduces "Faraday" gas refrigerator line. Crosley and Fada, radio companies, also embark in field with new electric lines.

R. F. Callaway named vice president in charge of sales of new Faraday Refrigerator Corp.

Jan. 27:

Crosley markets 4½-cu. ft. model for \$99.50.

Incomplete returns of 1931 sales show "Big 10" of industry sold 800,813 domestic units, with total sales by all companies reaching 925,000.

Frigidaire introduces line of individual unit air conditioners providing heating, cooling, and cleaning effects.

H. W. Newell appointed vice president in charge of sales for Frigidaire.

Feb. 3:

Frigidaire introduces low-priced "Morraine" line.

A.S.R.E. and A.S.H.V.E. hold joint conventions in Cleveland with air conditioning as chief topic of discussion.

Feb. 10:

Wired-home market saturation reaches 17.5%, NEWS estimates.

Frigidaire starts radio programs over 57-station chain.

Feb. 17:

Export business for 1931 off 13% from 1930 shipments, and down 22.8% from peak figures of 1929.

Appointments: J. A. Harlan as member of Kelvinator sales staff; John F. Ditzell as sales manager of Grigsby-Grunow.

Feb. 24:

New York, Illinois, and Maryland lead in quota sales, N.E.L.A. reports.

Norge introduces "Alaska" machine into low-price field.

White Mountain starts production of electric line after 57 years of making cabinet models.

Tricold Refrigerator Corp., Buffalo, publishes 20-page advertisement in NEWS to announce entrance into field with a line of refrigerators including a new type 2-compartment model.

Commercial unit sales for 1931 off 23.7%. Grinnell machine marketed for \$99.50 in 4.7-cu. ft. model.

M. F. Mahony appointed merchandising manager for General Electric.

March 9:

Frigidaire slashes prices on domestic units and air-conditioning equipment.

Majestic's book loss almost three millions between June 1, 1931 and Dec. 31, 1931.

March 16:

Stewart-Warner announces production of three household electric refrigerators.

Tricold adds "Childcare" line to production.

American Refrigerator Co. announces "American Beauty" line.

Charles W. Strawn appointed sales manager of Stewart-Warner refrigeration division.

March 23:

General Electric, Kelvinator, and Leonard announce price reductions.

Electric Refrigeration Bureau of N.E.L.A. approves \$320,000 publicity budget for 1932.

March 30:

NEWS publishes "1932 Refrigeration Directory and Market Data Book."

Zerozone enters low-price field with \$99.50 machine.

Howard E. Blood elected first vice president of Borg-Warner.

April 6:

National House of Representatives passes 5% revenue tax on manufacturer's wholesale price of all domestic units.

Majestic comes into low price group with \$99.50-\$149.50 line.

E. S. Matthews purchases assets of Electro-Kold; company's operations continued.

April 13:

Industry leaders obtain U. S. Senate hearing April 19 on new tax. All protest federal revenue measure as burden on companies.

Industry spent close to three millions on advertising in 1931, with 47% of total going to Saturday Evening Post.

R. C. Cosgrove named sales promotion manager of Westinghouse.

April 20:

Louis Ruthenburg, presenting electric

Former G-E Executive



M. F. Mahony was at one time merchandising manager for G-E.

manufacturers' case to Senate, offers counter-proposal of general manufacturers' sales tax or excise tax.

General Electric announces four-year service contract to purchasers.

April 27:

Nema members market 146,851 domestic units during first quarter of 1932.

Frigidaire opens branch factory at Toronto and pushes Canadian sales.

May 4:

General Electric organizes air conditioning department with J. J. Donovan as manager.

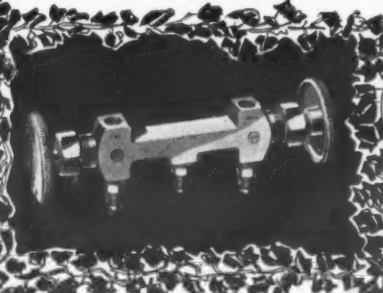
May 11:

Senate finance committee kills 5% tax on electric refrigerators before presentation of revenue bill to Senate for approval.

(Continued on Page 28, Column 1)

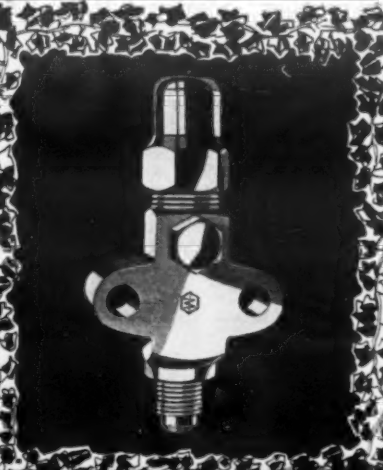


Weatherhead Fittings are so easy to install and so difficult to injure their threads—because they have that exclusive flatsided feature for non-slip wrench installation. They fit in everywhere as though they were designed individually for each and every job.



Testing Valves whose numerous applications make them indispensable to the serviceman—made as only Weatherhead can make them.

Presenting the only welded steel Manifold on the market for holding valves securely without soldering. Made in two to ten valve units with two valve spacings.



Flange Compressor Valves in the S.A.E. and patented Inverted types. Cut squarely from extruded brass for streamlined compactness these valves romp in so far ahead of the field there's no mistaking their strength. It's easy to see why Weatherhead Valves are winners—they have what it takes for all installations.



920-714 FRANKFORT AVE.
CLEVELAND, OHIO

REFRIGERATION PARTS

Aggressive Sales Builder



To Norge Vice President John Knapp is conceded much of the credit for the rapid rise of that company's sales shortly after the turn of the 30's.

1932

(Continued from Page 27, Column 5)

Freeze King Refrigerator Corp. starts production in Chicago.

Appointments: James A. Sterling as sales promotion manager, and D. C. Roads as advertising manager of Norge.

May 18:

NEWS publishes complete specifications for 33 makes of household electric refrigerators.

Gibson produces three-temperature model with water-cooler, air conditioned food compartment in 14-cu. ft. size.

May 25:

Graybar Co., Chicago, begin manufacture of "Graybar Ilg-Kold."

U. S. Radio and Clago companies introduce hermetically sealed models at R.M.A. convention, Chicago.

Appointments: Homer H. Hardy as export manager for Trupar; George D. Kobick as apartment division manager for General Electric.

June 1:

Senate restores 5 per cent tax on electric refrigerators.

June 8:

Refrigerator sales exceed those of automobiles for first time in history, according to April survey conducted by Nema.

N. E. L. A. convention at Atlantic City greatly curtailed affair.

President Hoover signs budget-balancing tax bill, including tax on mechanical refrigerators.

R. C. Cosgrove becomes head of Westinghouse refrigeration division.

June 15:

J. R. Morash, former president of General Refrigeration Company, dies in Beloit, Wis.

Westinghouse offers four-year guarantee on hermetically sealed unit.

June 22:

Government tax in effect June 21 with payments ordered monthly; last-minute buying wave caused by prospects wishing to avoid revenue measure.

Leonard dealer outlets gain 50 per cent in year.

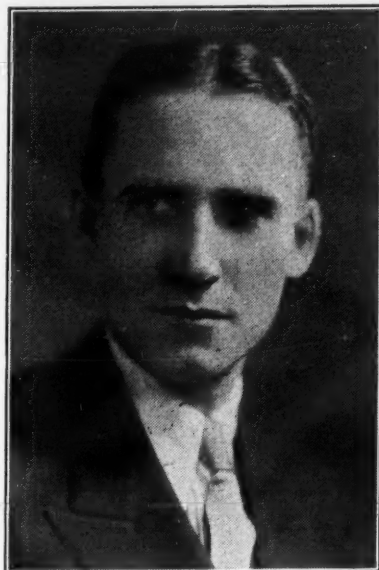
Electric Refrigeration Bureau's budget curtailed because of huge spending programs of member companies, says NEWS editorial.

June 29:

Kelvinator starts production of "Right-way" oil burner.

Specifications of 342 models by 49 refrigerator companies published by NEWS in "Specifications" section.

Promotion Planner



Vance Woodcox inaugurated many of Kelvinox's promotion plans and stunts as director of advertising and sales promotion, before joining Geyer-Cornell-Newell.

July 6:

Six months' sales for Norge equal total volume for 1931.

Montgomery Ward markets oil-burning Trukold machine.

July 13:

Frigidaire No. 2,250,000 sent on world tour by Company.

NEWS editorial comments on numbers of dealers going out of business because of competition from "fly-by-night" retailers; advises manufacturers of best known machines to lend individuality to

products and thereby eliminate sales resistance based upon price appeal.

July 20:

Copeland, General Electric, Kelvinox, Norge, Stewart-Warner, and Westinghouse engage space for exhibits at "A Century of Progress."

Vance C. Woodcox becomes advertising and sales promotion manager of Kelvinox.

July 27:

Sales by 10 Nema companies for six months show gain over 1931, but dollar volume drops appreciably.

Sales Director



Frank R. Pierce has been sales manager of Frigidaire since 1932.

Kelvinator sues Domestic Industries for alleged infringement of two patents on shaft seals for compressors.

Aug. 3:

Frigidaire opens factory branch near Chicago.

NEWS begins attempt to secure reliable statistics on sales from manufacturers outside Nema group.

Aug. 10:

"Air Conditioning" issue publishes information on products of 45 manufacturers with classified directory of systems.

"All work, no play" marks convention of General Electric distributors at Camp Refrigeration VI, Cleveland, as company plans intensive fall sales campaign.

Appointments: George M. Dwelley as sales manager of Jewett; E. J. Dalton as general manager of General Refrigeration Company, Beloit, Wis.

Aug. 17:

Servel's 5,000 salesmen to begin fall sales campaign Sept. 6.

Aug. 24:

Gibson becomes 11th member of NEMA; Louis Ruthenburg re-elected chairman for third term.

Grunow announces production beginning Nov. 1.

NEWS editorial advises distributors to cease demands for lower prices and added discounts from manufacturers as aid to stabilizing business.

Aug. 31:

Frigidaire introduces \$112 model, price including installation.

Domestic Industries markets 4.4-cu. ft. Buckeye machine for \$69.50.

NEWS editor views Frigidaire's entrance into low-price field as first move in bitter price struggle among major manufacturers.

Sept. 7:

NEWS, in message to dealers, warns against retailing of cheap, unknown brands as danger to consumer confidence.

Department stores plan unprecedented expansion of electric refrigeration sales facilities; utilities gradually withdrawing from merchandising picture.

Sept. 14:

Westinghouse slashes prices on four smallest models.

NEWS proposes impartial laboratory tests of all makes to arrive at reliable system of standards.

F. H. Pierce appointed sales manager of Frigidaire.

Sept. 21:

Trend toward hermetically sealed machines reflected in NEWS editorial.

General Electric brings out "Junior" line in low-price range.

Sept. 28:

Crosley Radio becomes 12th member of Nema.

Louis Ruthenburg resigns as president-general manager of Copeland.

NEWS lists sales training as most important factor in 1933 retail selling.

Oct. 5:

W. R. Wilson, chairman of Copeland board, becomes president of firm.

Hubbub over machine prices real need for companion merchandise lines, says NEWS editorial.

Iowa district court rules Frigidaire's Blackmore and Summers patents on "cold control" valid in suit against Majestic dealer.

New three-model Frigidaire line uses Statflex aluminum foil insulation construction.

Oct. 12:

Leonard matches Frigidaire with \$112 model.

Apex consolidates production in old plant of Jordan Motor Co., Cleveland.

Joseph Lincoln Baker, pioneer in industry, retires from active management of Baker Ice Machine Company, Omaha, Neb.; J. M. Fernald succeeds as general manager.

Oct. 19:

R. E. Olds, auto manufacturer, enters field as manufacturer of brine systems for refrigerated trucks in old Kold-Hold plant, Greenville, Mich.

Frigidaire buys Meterice coin device company.

Johns-Manville introduces "J-M Zero-lite," rock wool insulation.

Oct. 26:

Kelvinator comes down to \$112 "Magic Price" in 1933 line.

General Motors manufactures private brand for department stores in Frigidaire plant, Dayton, under name of Domestic Engineering Co.

Move toward cleaning up patent difficulties in industry noted in NEWS editorial.

Nov. 2:

NEWS estimates sales for first nine

Storm Center



Bill Grunow introduced a line of refrigerators bearing his own name in 1932, and since that time has been a storm center of controversy about advertising.

months at 750,000; 80 per cent sold by "Big Ten," and rest by smaller manufacturers; sharp sales drop shown in third quarter.

Nov. 9:

Mayflower announces 4.5-cu. ft. model for \$112.

Nov. 16:

General Electric announces "Controlled Sales Plan" of marketing electric appliances through large department stores.

Companies turn to new sales outlets as reports presage industry's first drop in volume in last decade.

Stevens Walden, Inc., Worcester, Mass., enters field; H. T. Tudor manager of company's refrigeration division.

Detroit Lubricator and Minneapolis-Honeywell introduce new commercial controls.

W. C. A. Bickman named sales manager of Buckeye.

Nov. 23:

Westinghouse cuts prices from \$35 to \$110.

Electric appliances account for only 0.5 per cent of department store sales in 1931, survey shows.

(Continued on Page 29, Column 1)

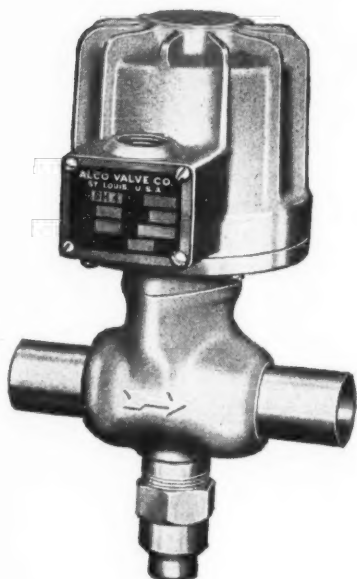
Once Iceboxes-Now Electric



Gibson was a very old name in the icebox field, but not until the early 1930's, under the administration of President Charles Gibson, did the company introduce an electric refrigerator.

Important News — ALCO

again scores a hit - -



THE SM44

MAGNETIC STOP VALVE

For METHYL CHLORIDE or FREON
Liquid or Suction

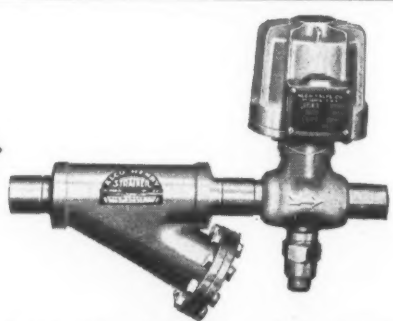
HIGH LIQUID CAPACITY AT MINIMUM
PRESSURE DIFFERENCE

Refrigerant	Capacity in Tons of Refrigeration with CH ₂ Cl and F12, Based on 1" Subcooled Liquid Discharge, and Pressure Differences Between Valve Inlet and Outlet as Follows:					
	1 lb.	2 lbs.	3 lbs.	4 lbs.	5 lbs.	6 lbs.
CH ₂ Cl	32.4	40.8	47.4	53.2	58.4	63.2
F12	16.2	20.4	23.7	26.6	29.2	31.6

To prevent flashing of liquid refrigerant beyond valve, provide subcooling to compensate for pressure drop.



List Price
Complete
\$49.00



As furnished complete with standard equipment

● A packless, heavy duty, tight closing, electrically operated, magnetic stop valve for liquid or suction line applications.

● With solder line connections for direct solder of 7/8" O.D. tube or pipe; or for 1", 1-1/8", 1-3/8", or larger O.D. tube or pipe by using standard solder type couplings.

● Equipped with manual operating stem for use in case electrical current is interrupted.

● Available for all usual voltages and frequencies as specified.

● Regularly equipped with 8954A Filter unless otherwise specified.

Specify SM441 For Liquid Line Application
Specify SM442 For Suction Line Application
Specify Voltage and Frequency in All Cases

For Further Details, Ask for Bulletin 141D

THERE IS AN ALCO SUPPLY HOUSE NEAR YOU

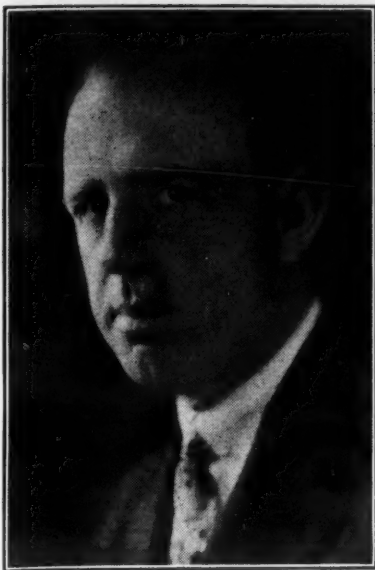
ALCO VALVE CO., INC.

2628 Big Bend Blvd., St. Louis, Mo., U.S.A.

Baltimore	Cleveland	Houston	Memphis	Philadelphia	San Antonio
Charlotte	Dallas	Indianapolis	New Orleans	Pittsburgh	San Francisco
Chicago	Detroit	Kansas City	New York	St. Paul	Toronto
Cincinnati	Fort Wayne	Los Angeles	Oklahoma City	St. Louis	

Thermo Valves — Expansion Valves — Magnetic Valves — High Pressure Float Valves
Low Pressure Float Switches — For the Automatic Control of Refrigeration

Introduced the 'Shelvador'



When Powel Crosley, Jr., introduced the "Shelvador" in his 1933 refrigerator line he started a "gadget" era during which much emphasis has been put on convenience features.

1932

(Continued from Page 28, Column 5)

Nov. 30:

Frank E. Smith retires as president of Servel.

Kelvinator and Universal Cooler show stock earnings.

Carrier gets air conditioning contract for 70-story R. C. A. building.

Appointments: Henry C. Bonfig as Grunow sales manager; H. P. Lehman as commercial sales manager and H. S. Turner as service manager for Frigidaire.

Dec. 7:

Grunow introduces line of refrigerators with a low-pressure unit using Carrene; streamlined cabinets, and sales emphasis on "safety."

General Electric organizes Contracts Corp. to handle time sales.

Dec. 14:

Frigidaire licenses four manufacturers to make cold controls and 48 companies to use product.

General Electric produces \$119 model.

T. Ronald Allen named division manager of Copeland's new department store division.

A. W. Oakley elected president of A. S. R. E.

Dec. 21:

Bureau of Census shows 808,504 domestic machines made in 1931; value set at \$101,663,647; sales volume up 34.2 per cent, but dollar volume down 1.4 per cent.

Dec. 28:

Servel introduces "Crusader" line in \$112 class.

Tricold orders 10,000 machines from Universal; Rex to make company's cabinets.

Die-stamping of cubage capacity into cabinet recommended as move toward uniform practices.

New York judge holds Du Pont lacquer patents invalid.

1933

Jan. 4:

Gibson markets 2-cylinder hermetically sealed line and kerosene-powered units for rural use.

Frigidaire reduces warranty to one year.

Jan. 11:

Crosley introduces "Shelvador" feature (recessed door panel for storage of small food articles) into 1933 line.

Engineering section incorporated with News every week.

G-E establishes specialty appliance sales department for all major appliances with P. B. Zimmerman as manager.

Fedders Mfg. Co. introduces 5 new dry-expansion type evaporators for household units.

Jan. 18:

Public utilities dissolve Nela, form Edison Electric Institute.

Tricold's "Potter" line uses three-zone cooling system.

Manufacturers making bids for new distributors using criterion of failures caused by handling "fly-by-night" lines.

New cabinet styling and changes in Rollator mark new Norge line.

Jan. 25:

G. M. Johnson, Universal Cooler president, head Refrigeration Division of Nema; Ruthenburg retained as consultant.

McCord introduces stainless steel flexing ice cube tray.

NEWS lists 927 independent service companies.

Feb. 1:

Majestic uses electro-sealed units and "Isolator Wall" construction.

Briggs Mfg. Co. prepares to make cabinets for Grunow.

Feb. 8:

Copeland's 1933 cabinets use full length of box for food storage; new compact unit concealed in back of machine.

Detroit Paper Products introduces corrugated fiber insulation with glossy heat-reflecting surfaces.

Servel, General Electric, Frigidaire, Kelvinator, Westinghouse, and Nema Refrigeration Bureau spent a total of \$3,514,195 on national magazine advertising in 1932.

New York state sales in 1932 about one-fourth of national total.

NEWS publishes resume of title retaining and personal property lien instruments used in various States for retail installment sales.

Feb. 15:

Frank E. Smith, former Servel president, dies.

Sales total of 840,000 units in 1932 about the same as 1929 figures.

Saturation of wired home market placed at 20.12%.

Alco Valve Co. introduces new all-refrigerant thermostatic expansion valve.

Detroit Lubricator Co. introduces a new gas-charged power element.

Feb. 22:

General Electric builds low-pressure rotary at \$99.50. New Deluxe model uses methyl formate and has solid steel "Monitor Top" condenser.

Johnson Motor Company, Waukegan, Ill. brings out "Jomoco" line.

General Electric lifts "cold canvass" burden from dealers' shoulders by establishing closed territories with kitchen appliances major sales units.

March 1:

Majestic markets 3.4-cu. ft. model for \$79.50.

E. W. Dickenson of Tampa, Fla. elected president of Frigidaire B.T.U. club for leading salesmen.

March 8:

Fleetwood Sales, Inc., Philadelphia, markets "Carba" machine, using solid CO₂ as refrigerant.

Crosley extends credit lines to dealers during bank moratorium.

Thousands view all-electric kitchens and movie stars at "42nd Street Special" under auspices of Warner Bros.-General Electric moves across the country.

March 15:

New Electrolux air-cooled models introduced.

Don M. Compton resigns as vice president of Grigsby-Grunow.

French Mfg. Co. uncovers process for making refrigeration tubing in lengths of 200 ft. or longer.

March 22:

Frigidaire cuts base price to \$96, Kelvinator to \$97, for limited periods.

Frigidaire standard line has rotary compressor and uses F-114.

Le Roi J. Williams named general manager of Majestic.

Guarantee period cut by Westinghouse from 4 years to 1 year.

NEWS publishes specifications of 35 makes of 1933 refrigerators.

March 29:

Control of Copeland in hands of creditors' committee; W. R. Wilson, president, and E. H. Brown, vice president, asked to tender resignations.

Manufacturers introduce beer coolers as beverage becomes legal. Temperite building 100 coolers per day.

Frigidaire is licensed under Larkin coil patents.

April 5:

Trupar markets over-head air conditioner, cooling, circulating, and dehumidifying air from ceiling fixture.

Copeland continues business, cutting base price to \$95.

Charles D'Olive appointed sales manager of Trupar Mfg. Co.

April 12:

General Electric replaces "Junior" line with 1933 Hotpoint.

Westinghouse and General Electric offer new room-cooling equipment.

April 19:

Universal begins production of compressors up to 10 tons.

Factory production at General Electric stepped up sharply to meet demand.

Harvey Lindsay criticizes proposed E.T.L. test code for refrigerators, on basis of work done in the Dry-Zero laboratory.

Kerotest introduces GW back-pressure control for multiple systems.

April 26:

Kelvinator and Holland Furnace introduce new air conditioning units.

May 3:

NEWS proposes all-industry conference to consolidate divisions of interest.

H. J. Walker Jr. to head Frigidaire public utility sales division.

Kelvinator shipments for April largest in company's history.

York introduces conditioners for homes and small businesses.

G-E specialty appliance department moves to Nela Park.

May 10:

U. S. Radio & Television introduces refrigerator with hermetic unit.

Norge production lags behind orders as company reports good turnover.

Major companies recalling workers as orders increase.

Consolidated Gas Co. properties in New York City to cease merchandising appliances.

May 17:

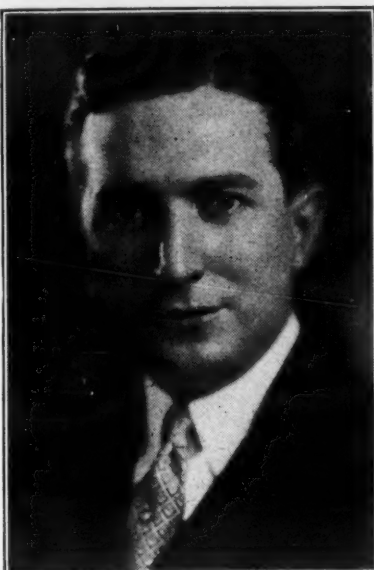
Servel brings out "Crusader" hermetic line beginning at \$99.50.

American Radiator introduces steam ejector for air conditioning.

NEWS editorial views rising prices as outcome of Roosevelt policies.

Appointments: J. E. Otis, Jr. as a director and Alemitte sales manager; and Frank A. Hiter as sales manager of

Well Remembered



The late W. D. McElhinny was a salesman of refrigeration before the 20's; he started his career with the forerunner of the present Frigidaire Corp., later went with Copeland, and then returned to Frigidaire. He was the prototype of the "personalized" school of specialty selling.

Stewart-Warner Corp. W. D. McElhinny as head of Frigidaire Commercial Division.

May 24:

G. M. Johnston, president of Nema Refrigeration Division, pledges support of organization to NRA and calls meeting for entire industry after bill's passage. Advance reports from manufacturers express willingness to cooperate for common good.

New Cutler-Hammer control incorporates wide cycle defrost mechanism.

May 31:

Refrigeration exhibits prominently displayed at Century of Progress.

NEWS calls for united front of industry to accomplish concerted action in approaching code conferences.

Deaths: C. T. Mutchner, Frigidaire publicity director, at Tucson, Arizona, May 28; Herbert I. Lord, Detroit Lubricator vice president, at Detroit, May 25.

June 7:

Paul Deming chairman of board for reorganized Copeland company; E. W. Atwood elected vice president.

Charles R. Klopp resigns as field sales manager for Majestic.

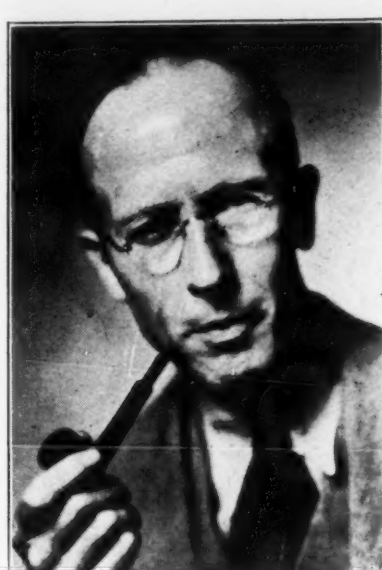
Appointments: J. A. Harlan as commercial sales manager of Kelvinator; George T. Bryant as field sales manager of Majestic.

Engineer and Salesman



Charles D'Olive held executive positions in both the engineering and selling phases of the industry before his appointment as head of Stewart-Warner's refrigeration operations.

Stands for Standards



Harvey Lindsay is perhaps best-known as the head of Dry-Zero Corp. but the industry also recognizes him as a leader of a movement to standardize procedure for testing refrigerators.

June 14:

Stewart-Warner expands facilities; Charles R. D'Olive new manager of refrigeration division.

Nema collecting data for industry conference on NRA.

June 21:

Westinghouse, Kelvinator, Majestic, and Leonard advance prices; General Electric cut prices; on Monitor Top models; (Continued on Page 30, Column 1)

INVISIBLE BUILDER

of Refrigerator Sales

The beautiful exterior of a refrigerator cabinet may attract the customer's attention . . . arouse his interest. But what's inside determines the customer's ultimate satisfaction and builds a solid, enduring foundation for future sales.

Unseen—hidden away within the refrigerator walls—Balsam-Wool Fiber Slabs are definitely helping refrigerator cabinet manufacturers to build business today. For proof we offer one fact: Balsam-Wool Fiber Slabs lead all other insulating materials in the volume used for domestic refrigerator insulation.

High in insulating efficiency—durable, non-settling, clean and economical to use—Balsam-Wool Fiber Slabs offer you exclusive advantages. It pays to use them.

WOOD CONVERSION COMPANY
Room 158, First National Bank Bldg., St. Paul, Minn. • New York, N.Y. • Chicago, Ill.

BALSAM-WOOL

FIBER SLABS

PRODUCT OF WEYERHAEUSER



Pushes Monitor Top Sales



A. M. Sweeney, who was school-ed in various divisions of the General Electric Co., was named to direct refrigeration sales in 1933.

1933

(Continued from Page 29, Column 5)
Westinghouse makes changes in design of its hermetic unit.

James W. Irwin appointed director of public relations by Frigidaire.

Sears Roebuck predicts sales of 25,000 Coldsports in 1933.

June 28:

Industry's inability to keep production up to demand seen as greatest present problem facing companies.

May production totals 175,119 units, highest in history.

Refrigerator Appliances Inc. introduces a line of finned evaporators.
Lee A. Clark named to head Frigidaire sales promotion.

July 5:

Five months' sales total 473,700.
Kelvinator's June orders close to 45,000-mark.

Refrigerator Association of New York City introduces uniform trade practice rules.

NEWS publishes specifications of beer coolers.

July 12:

Industry executives, meeting in Detroit with facilities provided by the NEWS, combine under Nema banner to start formulation of codes for electric refrigeration companies and parts divisions.

July 19:

Nema approves basic wage of 35 cents per hour, 36-40 hour week.

Westinghouse, Grunow introduce new models.

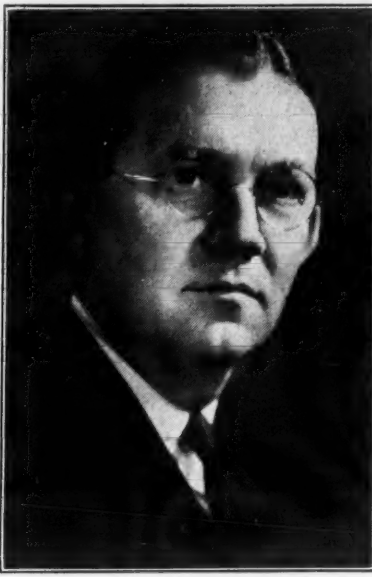
NEWS publishes its first rotogravure section, telling story of Chicago's "A Century of Progress."

Stewart-Warner Chief



One of the results in the change of management made by Stewart-Warner three years ago was the election of J. E. Otis as president.

Director of Advertising



Sam Mitchell came in from the field to direct Leonard advertising in 1933. He is now director of advertising and sales promotion for Kelvinator.

July 26:

Industry sets six-months' sales record with 693,000 units.

Grunow and U. S. Radio merger completed with William C. Grunow heading combined corporations.

New York circuit court declares Du Pont lacquer patents valid.

Flock of protests registered against Grunow advertisement in June 21 issue of NEWS, claiming "First Honors" at Century of Progress.

Aug. 2:

Low dealer stocks noteworthy as fall selling season opens.

Aug. 9:

President Roosevelt signs Nema code Aug. 4; regulatory measure becomes effective Aug. 15.

Refrigeration accessory manufacturers form own organization and plan to petition for Nema membership.

Westinghouse raises prices.

New Williams commercial compressor has paired cylinders.

Appointments: J. E. Otis as president of Stewart-Warner; Fred Erbach as vice president of Lipman.

Aug. 16:

Tricold, Stewart-Warner, Uniflow, Sunbeam, Merchant & Evans, and Wurlitzer seek admission to Nema.

York announces line of air-cooled machines.

NEWS reprints American Medical Association Journal editorial "Refrigeration and Cancer—A False Propaganda," blasting claims made in booklet written by F. A. Teigen.

Aug. 23:

Copeland offered for sale as going concern.

NEWS publishes specifications of 1933 makes of commercial machines.

Aug. 30:

Control of Copeland bought by Winslow-Baker-Meyering Co.

Samuel C. Mitchell appointed Leonard advertising manager.

Sept. 6:

Refrigeration Division members agree upon a code of fair practice Aug. 30.

Nema board refuses membership to parts group.

NEWS editorial sees need for electric refrigeration organization outside Nema.

J. G. Brown appointed sales manager of Zerzone.

Sept. 13:

Grunow moves into new Chicago factory as sales for first year total 70,000 units.

NRA code filed by commercial refrigerator industry.

Sept. 20:

Jud Sayre resigns as sales manager of Kelvinator.

NEWS publishes Beer Cooling Equipment Directory and Handbook.

Sept. 27:

G. M. Johnston re-elected president of Refrigeration Division, Nema.

R. I. Petrie succeeds Jud Sayre as sales manager of Kelvinator.

Oct. 4:

Revised Nema code terminates long guarantees on service, but leaves loophole by permitting extra charge for replacement of defective parts, if such charge is clearly defined in the company's advertising.

Appointments: A. L. Scaife as retail division manager for General Electric; Godfrey Strelinger as sales manager for Leonard.

Oct. 11:

Sid Mahan appointed Westinghouse merchandise advertising manager.

Frigidaire and Majestic boost prices.

Special editorial section in NEWS presents technical information on motors and Controls for refrigeration systems.

Oct. 18:

Industry spends \$743,018 on magazine advertising during first six months of 1933.

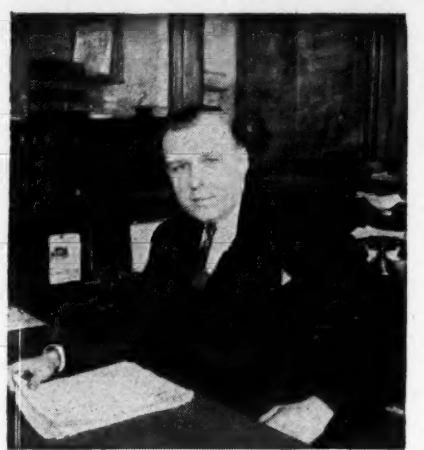
Department store sales 144% above 1932 figures.

Fedders introduces model 33 expansion valve.

Oct. 25:

General Electric offers four-year re-

With New Copeland Co.



W. G. von Meyer, a pioneer sales executive, joined the reorganized Copeland company as manager of commercial sales.

placement contract on Monitor Top unit for \$5. Extra charge included in the quoted price.

Detroit Lubricator introduces "non-adjustable" expansion valves.

Nov. 1:

R. O. Cunningham named president of Trupar.

Refrigeration Machinery Association plans NRA code.

Nov. 8:

Norge distributors hear plans for expansion. Line of commercial units introduced.

E.T.H. Hutchinson to direct all Sparton sales.

Detroit Lubricator licensed to make air-conditioning controls under the Lewis patents.

Nov. 15:

NRA retail code sets minimum wage for electric refrigeration commission salesmen; outside salesmen exempted.

Arthur A. Trostler, Majestic sales manager, killed in plane crash Nov. 9.

A. M. Sweeney named General Electric sales manager.

Nov. 22:

New owners of Copeland give definite word that properties will continue in active operations.

Reynolds Metal Co. announces aluminum foil insulation for refrigerators.

Nov. 29:

Majestic in receivership; Grigsby attributes failure to plant investment too heavy to be carried on volume of business and profits of company.

Kelvinator pays dividend from \$723,560 earnings at end of fiscal year.

Dec. 6:

Reports of 40 manufacturers show million sales in 10 months; Bureau quota for year 840,000.

Dec. 13:

A. R. Stevenson elected ASRE president. Servel introduces complete line of air-conditioning units, milk coolers in 1934.

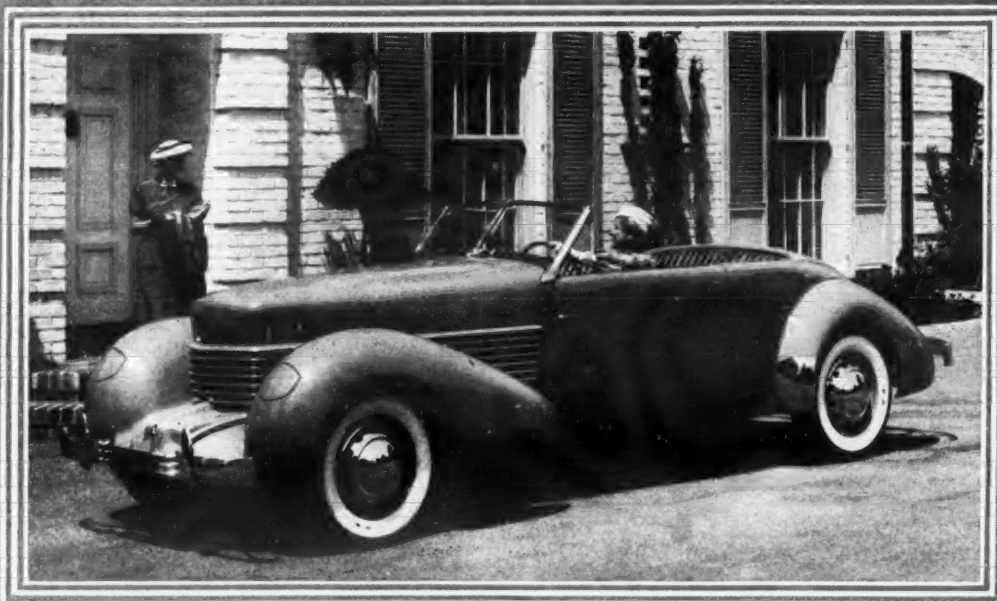
W. G. von Meyer appointed Copeland commercial sales manager.

Dec. 20:

Axel Wenner-Gren, Swedish financier, and principal stockholder in the Swedish Electrolux company, reported to be buying larger interest in Servel, Inc.

Domestic Industries, Inc. of Mansfield introduces "Frigitop" model.

(Continued on Page 31, Column 1)



QUALITY
IN EVERY DETAIL

CORD

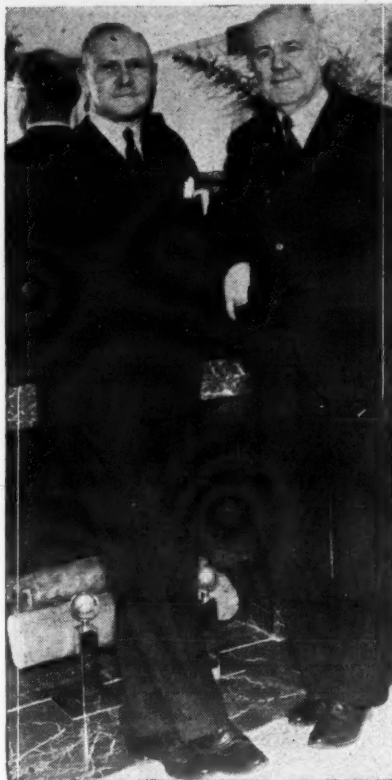
AUBURN AUTOMOBILE CO. AUBURN, INDIANA

G-E Dedicates Institute at Nela Park



Owen D. Young, General Electric board chairman, lights his pipe during a lull in the ceremonies marking the dedication of the General Electric Institute at Nela Park. T. K. Quinn is at his left. The picture is one of the best examples of Editor George Taubeneck's "candid camera" photography. The News was the first business paper to use "candid shots."

Dedicated Model Home



Vice President A. E. Allen of Westinghouse stands before the mantel of the "all electrical" experimental and showplace home which Westinghouse built in Mansfield, and opened early in 1934.

1933

(Continued from Page 30, Column 5)
Tricold re-named Potter Refrigerator Corp.

Dec. 27:
General Electric dedicates Institute, Nela Park, Cleveland, Dec. 22.
A. M. Taylor named Potter director of sales.
Courts quell Zenith publicity on Majestic receivership.
Lion's share of retail business in 1933 goes to 18.4% of dealers, according to "Electric Refrigeration Directory and Market Data Book."

1934

Jan. 3:
TVA announces first plans for marketing of appliances.
Code for commercial refrigerator industry approved.
American Injector introduces new automatic expansion valve.

Jan. 10:
Crosley introduces full-length door, Shelvatray, Shelvabasket in custom-styled 1934 line. Capillary tube refrigerant control employed.
Electric refrigeration's 1933 sales record unparalleled by any other industry.
Ferdinand J. Bommer new chief engineer for Potter.

Jan. 17:
Nema manufacturer members to furnish low-price models for TVA distribution.
Industry leaders concur in opinions voiced through letters to NEWS that 1934 will be best year in history.
T. B. Terry new production manager for Gibson.

Jan. 24:
Rolling shelves featured in new Stewart-Warner line.
Sunbeam starts production of "Major" series in upper-price bracket.
Six manufacturers list \$853,156 in national magazine advertising expenditures for 1933.
Auditorium Conditioning Corp. decides to license other manufacturers under its basic patents.
Underwriters' Laboratories issue extensive report on refrigerants.
Code for extended surface industry proposed.

Jan. 31:
Kelvinator's styled cabinets, food filing drawers, feature new models.
Majestic operates on limited basis as dealer convention voices confidence in firm's future.
Shaft seal eliminated from Grunow 1934 compressor.

Feb. 7:
Universal Cooler gets million-dollar 1934 supply order from Montgomery Ward.
Service policy clause holding up approval of industry's NRA code. Complete proceedings of code hearings published in the NEWS.

Feb. 14:
Sales for 1933 total 1,080,000 for new peak, with dollar volume lower; average retail price estimated at \$170; market judged 23.5% saturated; estimate 4,665,000 units in use in U. S.

Feb. 21:
McCord starts production of Petrogas system for refrigerating trucks.

Feb. 28:
Five per cent "nuisance" tax on electric refrigerators retained by House Ways and Means Committee.

Re-organized Copeland company announces plans through Dallas E. Winslow, president. New line of household refrigerators introduced.

Westinghouse dedicates its electrical home in Mansfield.

March 7:
Comeback by public utilities, cultivation of rural markets seen as features of 1934 selling.

American Radiator forms new air conditioning subsidiary with Fowler Manning in charge.

March 14:
Potter offers exclusive franchises to dealers in cities of 20,000-200,000 population, excluding department stores.

Kelvinator offers new, large commercial machines up to 20 hp. and extends fin coil line.

Brunner introduces new commercial units.

NEWS publishes specifications of 1934 models of commercial refrigerating machines.

Commercial unit sales hit new low of 63,600 in 1933.

H. G. Perkins elected vice president of Kelvinator Corp.

March 21:
Sanitary Electric Corp. formed to market Sanitary refrigerators.

TVA authorities claim prices quoted on electric refrigerators too high, although one-fifth to one-third below standard retail figures.

NEWS moves into own office building at 5229 Cass Avenue, Detroit.

Kansas City merchandisers draw up fair practice agreement.

NEWS publishes specifications of 1934 household refrigerators.

March 28:
Louis Ruthenburg elected president of Servel.

Westinghouse adds four-year replacement plan (for \$5 extra) to one-year warranty.

Salesmen in New Jersey petition for "rights" under NRA code.

April 4:
Nema group sells 109,521 units in first two months of year.

George Ball elected head of Grunow executive committee.

April 11:
Fairbanks-Morse enters refrigerator field.

General Electric production of Flat-tops hits 2,000 weekly.

Waukesha Motor Co. introduces gasoline-engine driven refrigerator and milk cooler.

Peerless Ice Machine introduces "flash cooler."

April 18:
Truscon Steel Co., Cleveland, starts production using Universal units.

NEWS editorial views code situation within industry as gloomy; no fair practice agreement in effect after 11 months of discussion by Nema and government.

"Flowing Cold" commercial equipment announced by Frigidaire.

April 25:
Frigidaire, Kelvinator and Westinghouse boost prices.

Winslow, Baker, Meyering Corp. buys Zerozone.

May 2:
Sparton and Jomoco join Nema Refrigeration Division.

New Detroit thermal valve has enlarged orifice.

Fedders introduces line of air-conditioning coils.

John Wyllie appointed Temprite sales manager.

May 9:
Change proposed in code for commercial refrigeration industry to establish down payment and terms agreements.

Philadelphia office survey shows employees' health improved by air conditioning.

Kelvinator, Norge report best April sales in history.

Westinghouse adds 4 models to commercial line.

May 16:
Atlanta dealers get temporary injunction, seeking to restrain Georgia Power from selling TVA appliances.

Unit air conditioning makers form association.

Harry C. Hayes, pioneer Absopure engineer, dies in Detroit at 48.

Westinghouse introduces air-conditioning compressors up to 6 tons capacity.

May 23:
Executives of Nema finally pass code of fair trade practice for consideration of NRA, May 22.

Dealers surveyed in Tennessee Valley area fail to show much liking for TVA plans.

May 30:
Fifteen manufacturers report 477,115 sales in first four months.

Air conditioning outstanding scientific exhibit at 1934 World's Fair.

EH&FA starts to sell appliances. Alabama and Georgia dealers appeal to President Roosevelt.

June 6:
Atlanta dealers withdraw injunction proceedings against Georgia Power in TVA tilt.

Thirty-five Century of Progress exhibits air conditioned.

June 13:
General Electric introduces "Lift-Top" model for \$74.50.

Electric Refrigeration Code approved by NRA June 11; replacement and war-

ranty guarantees differentiated according to agreement.

Halderman Finnie named Nema Refrigeration Division manager.

June 20:

S. V. Allmont appointed head of Kelvinator's new liquid cooling division.

Frigidaire plans to market \$77.50 unit.

Temprite Products introduces a 2-temperature valve.

June 27:

Frigidaire lists air conditioners in self-contained units from \$340 up.

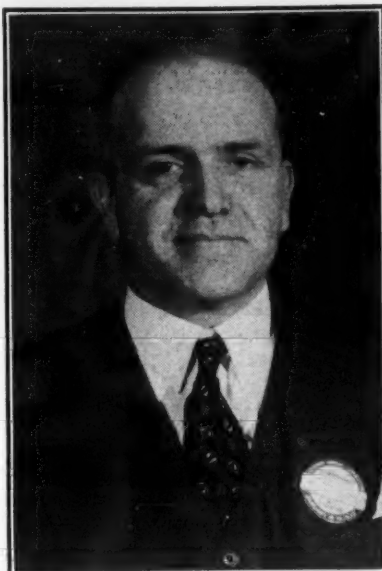
Kelvinator follows "chest" model trend with \$77.50 unit.

Engineer-Executive



John Wyllie, well-known in refrigeration engineering circles, now directs activities of Temprite Products.

Veteran Industry Leader



Louis Ruthenburg, veteran refrigeration executive and leader in industry cooperative activities, was elected president of Servel, Inc., in the spring of 1934.

Harvey Lindsay reports Dry-Zero slabs used in 180,950 refrigerators in past 4 months of the year.

July 4:

Kansas court rules Majestic cold control does not infringe Frigidaire patents. Finance charge schedule on commercial refrigerator sales approved.

July 11:

Kelvinator shipments for past nine months total 195,811, jump of 32%.

NEWS editorial reports dealers not interested in cut-price jobs of TVA caliber.

Strike of service men in New York City found to have been unsuccessful, although it brought some recognition.

July 18:

Chrysler forms Temperature Corp to manufacture "Airtemp" conditioner.

Georgia dealers, in telegram to NEWS, claim TVA models demoralizing retail business.

1934 magazine advertising expenditure of \$1,071,364 is 44% increase over previous year.

W. B. Henderson named RMA executive vice president.

(Continued on Page 32, Column 1)

Financial Wizard



Holder of many positions of responsibility in the Kelvinator organization, H. G. Perkins was elected vice president in 1934.

Yes, I've SEEN PARKER RUST-PROOFING
ADVERTISED NATIONALLY



WHEN the salesman says: "This refrigerator is Bonderized," the average prospect knows that it means extra quality. National Advertising has impressed her with the value of Bonderizing and other Parker Processes.

She knows that under the enamel is a barrier to rust—a shield from the effects of moisture—that great enemy of paint finishes on iron or steel. She buys the Bonderized refrigerator with greater confidence, knowing that its sparkling beauty will last—that the enamel will not soon check and peel off. Bonderizing is an appealing sales feature that helps close deals. Make sure that your customer knows about it.

PARKER RUST-PROOF COMPANY, 2197 E. Milwaukee Avenue, Detroit, Michigan



For more than 21 years, we have devoted our entire time, talent and energy to the improvement of rust-proofing methods. A book showing what a refrigerator salesman should know about Bonderizing is available. Write for one today.

PARKER
RUST-PROOFING
processes
BONDERIZING • PARKERIZING

Directs G-E Advertising



Art Scaife was appointed director of advertising for the G-E specialty appliance sales department after training and directing dealers and salesmen for a number of years.

1934

(Continued from Page 31, Column 5)

July 25:

Crosley chest model retains Sheldor feature, selling for \$72.50-\$75. Chrysler air conditioner to retail at \$175.

Aug. 1:

Winslow-Baker-Meyering adds Trupar to holdings.

First half year sales by Nema firms hit peak of \$91,837. Norge, Frigidaire, Leonard, and Westinghouse market \$77.50 chest models.

Aug. 8:

Consumer's Research threatens lawsuit against NEWS for alleged derogatory comment on its reports and recommendations on effects of refrigerants.

Georgia dealers lead attack on TVA merchandising program. Say profit margins are too small.

NEWS publishes specifications of chest models.

Aug. 15:

Servel denies plans to abandon electric refrigeration field in favor of exclusive Electrolux production.

Refrigeration Appliances adds to plant capacity.

Aug. 22:

Potter purchases Jewett, using plant for assembly.

Automatic Products of Milwaukee designs refrigerant control valve.

Market saturation too slow to cause settled output, says NEWS editorial.

Radio industry argues for a code separate from that for electrical industry.

Sparton's Leaders



Capt. William Sparks, retired president of Sparks-Withington, introduced the Antifrost clock on Sparton refrigerators early in 1935. His son, Harry Sparks, now president, is at the left.

Aug. 29:

P. A. McKittrick elected president of newly-formed Unit Air Conditioner Manufacturers Association.

NEWS air conditions its new home.

Sept. 5:

NEWS publishes digest of corporate history of electric refrigerator manufacturers no longer active.

NRA code for wholesalers put into practice.

Sept. 12:

Electric refrigeration advertising leads all other electrical appliances in advertising expenditures.

Norge buys Detroit Vapor Stove Co.

Sept. 19:

Bondholders committee orders liquidation of all Majestic properties, rejects reorganization plan.

Norge displays 15 color combinations in exhibit at Detroit.

Thermal Units brings out 8-cylinder commercial unit.

Sept. 26:

Atwater Kent plans entrance into electric refrigeration field in fall.

Oct. 3:

Department stores gaining respect in industry as constructive retail force, says NEWS editor, as quality lines and trained salesmen replace former "sell-to-a-price" tactics.

Edward R. Legg heads Kelvinator national direct sales department.

Oct. 10:

Manufacturers pay \$5,525,912 in federal taxes during fiscal year ending June 30, more than doubling 1933 figures.

All built-in appliances eligible under FHA financing.

Appointments: Harry Newcomb as gen-

Nema Chairman



Thomas Evans, president of Merchant & Evans, was elected chairman of the Household Section of the Refrigeration Division of Nema early in 1935, and has remained in that capacity since.

eral manager of Servel's electric division; W. C. Rowles as sales manager of Norge.

Oct. 17:

Refrigeration Service Engineers Society holds first annual convention in Chicago. Peerless opens factory in New York.

Oct. 24:

G. M. Johnston re-elected president of Nema Refrigeration Division.

Oct. 31:

NEWS editorial states position that industry is progressing sanely under own power, with public approval, and should not be tampered with by government regulatory agencies.

NEW publishes specifications of air-conditioners.

Nov. 7:

Copeland, Mayflower, and Zerozone manufacturing combined in new Detroit plant.

Fairbanks-Morse introduces Conservador feature in 1935 line.

Seeger adds to factory space.

Nov. 14:

Nema fights efforts to have Heating, Piping and Air-conditioning contractors code forced on refrigeration industry.

Universal Cooler gets Montgomery Ward contract for 22,500 units.

Hardy Mfg. organized to make refrigerators.

Lipman brings out 4-cylinder units.

Nov. 21:

President sets TVA retailing system as model for all other states.

Norge increases size of Muskegon plant.

Nov. 28:

Kelvinator reports year's profit of \$1,203,438; directors declare extra dividend.

P. E. Sellman elected vice president of Servel.

Nema agrees that RMA code will govern sales practices on all machines of 1 hp. or more.

Dec. 5:

Sales at end of 10 months total 1,315,400. Willis H. Carrier gets A.S.M.E. distinguished service award.

L. D. O'Connell appointed air-conditioning manager for Westinghouse.

Dec. 12:

Commercial refrigeration is theme of A.S.R.E. winter meeting. Copeland, Zerozone, and Mayflower operations moved to Detroit plant.

Dec. 19:

Atwater Kent starts production.

NEWS editorial notes diversification in major manufacturers' lines.

Clyde E. Ploeger becomes chief engineer for Servel.

New Gibsons incorporate flat, full-width evaporator shelf.

Stewart-Warner goes to a 1-cylinder compressor.

Dec. 26:

Grunow gets Federal Reserve Loan and markets three lines.

Frigidaire plans 500,000-unit production in 1935.

Cutler-Hammer announces controls for replacement use in household refrigerators.

Trend toward large sales by small number of dealers indication that industry cannot progress without capable retailers, says NEWS editorial.

1935

Jan. 2:

Frigidaire withdraws branch operations from New York and Baltimore.

Industry sells 1,400,000 units in 1934 for 30% sales jump.

Crosley expands plant to begin 2,000-per-day schedule.

Leaders predict first 2,000,000 sales mark for 1935.

Charles D'Olive appointed to be assistant to president of Stewart-Warner, in charge of refrigeration engineering and sales. John Ditzell is named sales manager on appliances.

Jan. 9:

New lines show trend toward streamlining, removable shelf ideas.

Jan. 16:

Major Appliance Corp., Chicago, announces single-model, single-franchise policy.

Most manufacturers abandoning chest models.

H. W. Sweatt elected Minneapolis-Honeywell president.

New line of parts announced by Riley Engineering Corp.

Southern dealers declare truce with TVA.

Jan. 23:

Geoffrey M. Johnston, Universal Cooler president and Nema Refrigeration Division chairman, dies in New York, Jan. 17.

Appointments: A. L. Scaife as sales promotion and advertising manager for General Electric; John C. Bonning as merchandising director for Potter; John Garceau as sales promotion manager for Kelvinator.

Antifrost clock and Baskador feature new Sparton models.

New "Coldspots" have ultra-modern styling.

Directs Air Cooling Sales



As Kelvinator expanded its operations in the air-conditioning field, J. K. Knighton was appointed sales manager.

Jan. 30:

Jewett continues production as Potter fails to exercise option.

Kelvinator launches Home Service program as selling aid.

Feb. 6:

Buckeye line confined to one model for 1935.

Feb. 13:

Nema creates Household and Commercial Refrigeration sections; Thomas Evans named chairman of former group.

Frigidaire introduces 16-model line, selling from \$79.50 to \$534.50.

Appointments: F. S. McNeal as general manager of Universal Cooler; L. E. Taufenbach as sales manager of Gibson; Elmer A. Kleinschmidt as vice president of York.

Feb. 20:

Market saturation point for refrigerators reaches 28.2%.

Dollar volume for 1934 up 30%, totaling \$239,080,000.

Coin-meter comes to front again as Frigidaire, Kelvinator, and Leonard push "meter bait" plan.

Feb. 27:

General Electric shows Balltop and Flatop models for 1935.

Hercules Co. to retail Servel-made units. Rating conditions for commercial condensing units approved by associations and engineering groups.

Fedders Mfg. Co. introduces a constant pressure valve and a check valve.

March 6:

Norge demonstrates "painless selling" with five-act play shown to 175,000 prospects in 65 cities.

York's new portable conditioner has air-cooled condensing unit.

Gibson Sales Director



Gibson started off the new year 1935 by appointing Les Taufenbach as sales manager.

March 13:

Dwight Holland, Newark, Ohio, Frigidaire dealer, duped into selling 143 "demonstrator" models to Macy's, New York department store not holding Frigidaire franchise. NEWS "breaks" industry's major bootlegging story.

January sales 103,500, setting all-time high.

W. Paul Jones appointed vice president of Fairbanks-Morse.

Larkin Refrigerating Corp. opens new plants in New York and Chicago and expands line of coils.

March 20:

Wired home market expands as saturation point rises, assuring good future selling, says NEWS editorial.

Automatic Products introduce new water valve.

(Continued on Page 33, Column 1)

Important TO MANUFACTURERS OF DISPLAY REFRIGERATION EQUIPMENT

The new LOXIT type Ace Hard Rubber Doors are attracting wide attention due to their new and valuable improvements in construction and design. • It will pay you to investigate LOXIT at once as the new doors are now available at no extra cost. Write to

AMERICAN HARD RUBBER CO.

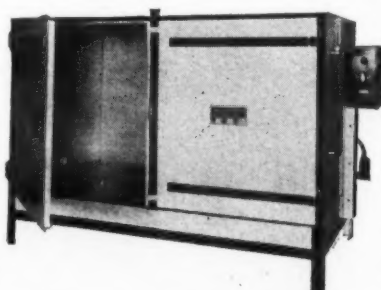
11 MERCER ST., NEW YORK, N.Y.

AKRON, OHIO

111 WEST WASHINGTON ST., CHICAGO, ILL.

A practical low-priced oven

For Refrigeration Service Shops and Distributors...



Here is the oven you service men and refrigerator distributors really want—an oven that is practical for the service shop and a standard oven that is really low priced.

Put a Despatch Type C Oven in your service shop. Use it for dehydrating your refrigerator units. Marvel at the uniform and positive results you get in such a short time and with such low costs.

Then use it for baking and drying your finishes. It will do a fine job and your customers will certainly be pleased too.

Now use it for baking and drying insulating jobs that always come up around the service shop. Despatch Type C Ovens are general utility ovens and that makes them of such outstanding value to any distributor and service man.

And the prices are the lowest for a standard service station oven. Equipped with gas or electric heating systems, and made in every size to meet individual requirements, these ovens range in price from \$48.00 up. Prices asked for these ovens only represent a fraction of their real worth. Standard ovens can be shipped immediately from stock.

WRITE TODAY for bulletin illustrating these ovens and outlining the remarkable low prices. Tell us about your problem too—Despatch can help you.

DESPATCH OVEN CO.

634 Ninth St., S. E.

Minneapolis, Minn.

20 GASKET TYPES SERVICE 80% OF ALL REFRIGERATORS

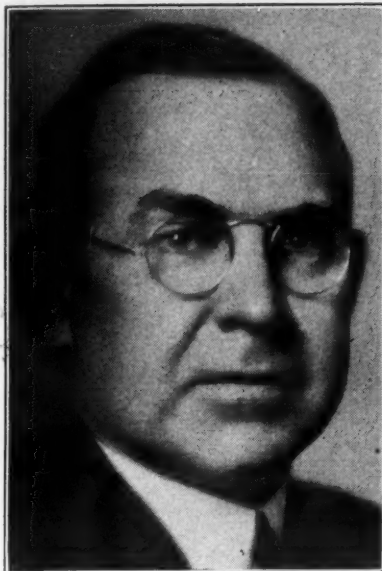
Miller has simplified rubber gaskets so that 20 styles will service 80 per cent of all refrigerators. For profitable repair jobs—stock these styles.

Other types and shapes for practically every type of unit manufactured are available. Make money with Miller Refrigerator Gaskets. If you cannot secure them through your local jobber, write direct. Miller Rubber Company, Inc., Akron, Ohio, U. S. A.



Miller
"ENGINEERS IN RUBBER"

Universal Cooler Chief



A refrigeration manufacturing executive of many years' experience, Frank S. McNeal was elected president of Universal Cooler in May, 1935.

1935

(Continued from Page 32, Column 5)
Ranco's new control has stainless steel construction.

March 27:

Installation standards in air conditioning seen as prime need in establishing closer price margins.

Electrical wholesalers and radio wholesalers are to impose code on refrigeration distributors.

NEWS publishes specifications of air conditioners.

April 3:

NEWS editor reports Sparten bootlegging in Chicago.

J. A. Harlan elected head of Nema Commercial Section.

April 10:

February sales records smashed with 128,300 total.

"1935 Refrigeration and Air Conditioning Directory," first volume of Refrigeration Library, published by NEWS; 1,200 manufacturers of machines and equipment listed.

NEWS opens columns to national sales managers to suggest best selling methods to dealers.

Gibson offers 4-year service contract. NEWS starts publication of "Master Service Manual" by K. M. Newcum in serial form.

April 17:

Manufacturers and New York department stores reach agreement and end retail price war in city's \$10,000,000 retail market.

Re-named Air Conditioner Manufacturers Association establishes offices in Washington.

April 24:

General Electric introduces eight machines for comfort summer cooling ranging from 1.8 to 21.5 tons capacity.

Credit men attack "winter selling," coin-meter plans in industry.

May 8:

Frank S. McNeal elected president of Universal Cooler.

Borg-Warner starts marketing of replacement parts for all makes.

Virginia Power Co. introduces plan of renting, not selling chest models in lower income group homes.

Mills Novelty Co. issues complaint with Federal Trade Commission against ice cream manufacturers for tactics in fighting counter freezers.

May 15:

All-manufacturer sales total 459,800 for first three months of year.

Grunow advertising questioned by Milwaukee Commerce Association.

May 22:

Electromatic Corp., valve maker, moves to new plant.

Crosley fiscal year report shows sales up 50%, profits doubled.

Cold spring weather hurting sales in northern section of country.

Edward Barger appointed service manager of Universal Cooler.

Medical research indicates colds aren't transmissible under controlled air conditions.

May 29:

Nema approves organization of a Refrigeration Accessories division.

A.S.R.E. studies new standards for rating condensing units and air conditioning advances at Detroit meeting. NEWS holds a "Refrigeration Fiesta" in its new building to entertain the visiting engineers.

W. B. Henderson elected vice president of ACMA.

Milwaukee Better Business Bureau bulletin says hazards attributed to refrigerants are being exaggerated.

Self-regulation preferable to defunct NRA control form, industry leaders reply to NEWS telegram as U. S. Supreme Court outlaws Blue Eagle.

Sales aggregate 741,700 units at four-months' mark.

General Electric holds Cleveland premiere of "Three Women," promotion motion picture.

June 12:

Edison Electric Institute bureau to promote sales of complete electric kitchens proposed by P. B. Zimmerman.

June 19:

NEWS publishes "1935 Refrigeration and Air Conditioning Market Data Book," volume II of Refrigeration Library.

Rebirth of ice industry noticeable in organized ice refrigeration bureaus, stylish and well constructed ice refrigerators, and customer interest.

Buffalo dealers and service men fight proposed local ordinance for licensing service men.

T. J. Newcomb named commercial sales manager for Westinghouse.

June 26:

Price cutting in Wisconsin territory fought by Milwaukee distributors as \$5 profit-per-sale becomes standard.

First Bancredit Corp., FHA cooperative, extends low-interest financing on refrigerators.

Lipman introduces new air conditioning lowbids.

July 3:

Million units sold to distributors, dealers during first five months of year.

Ruthenburg calls on managements to adopt sound worker-relationship policy.

H. W. Newell leaves Frigidaire to join advertising agency.

July 10:

Milwaukee dealers fight group buying by factories.

Fielding C. Chandler made dealer division manager for General Electric.

July 17:

Appointments: Walter Jeffrey as domestic advertising manager of Kelvinator; Lee A. Clark as advertising manager for Frigidaire.

July 24:

Compressor equipment and Freon absorbed in Chicago air-conditioning installation blast; city authorities demand licensing of installation men after two die.

Vance C. Woodcox heads appliance division of Montgomery Ward.

Westinghouse air-conditioning sales headquarters moved to Mansfield; under direction of Shel Meyers.

July 31:

Detroit distributors act to end "distress" price advertising by dealers seeking to clear 1934 stocks.

Appointments: S. C. Mitchell as director of advertising and sales promotion for Kelvinator; Harry E. Thompson as chief engineer for Brunner.

Aug. 7:

Unattached appliances ruled eligible under FHA loan plan.

Inquest absolves machinery and refrigerant after fatal explosion in Chicago.

NEWS begins publication of four specialty selling issues for sales use in seasonal August slump.

Aug. 14:

EH&FA is divorced from TVA and seeks new charter which would enable it to promote appliance sales on a nation-wide basis.

General Electric builds plug-in type air conditioner.

Appointments: Godfrey Strelinger as assistant to vice president, and V. J. McIntyre as domestic sales manager of Kelvinator; R. I. Petrie as sales manager of Leonard.

Aug. 21:

U. S. Treasury Department rules reconditioned machines to which replacement parts have been added subject to five per cent tax, as well as multiple installation units.

Airtemp becomes Chrysler subsidiary.

C. W. Smith appointed sales manager of Apex.

Aug. 28:

Sale of "leaders" viewed as dubious sales policy as public turns to larger, better appointed models.

Sept. 4:

Underwriters change regulations for refrigerants, motor controls, and copper tubing in 1935 standards for commercial units.

He Tells Leonard's Story



Paul Sowell has been directing Leonard refrigerator advertising during the past year.

Appointments: Paul Sowell as advertising manager of Leonard; Oscar H. Buschmann as assistant chief engineer of Brunner.

Sept. 11:

Seven-months' sales total close to 1,350,000 mark.

Advertising agency investigators report refrigeration industry practices present clean slate in comparison to American standard.

Parker Mfg. Co. uses "trunk-type" pistons in new line of compressors.

Sept. 18:

Manufacturers spend 60% more on advertising during first six months of 1935 than for same period in 1934.

New York FHA loans on electric re-

frigerators one-third of city total for all purposes.

New formed Ebco Co. buys Ebinger Co. of Columbus and plans production of cabinets.

Sept. 25:

Jobbers of refrigeration parts make plans to meet in Detroit, Oct. 23, to discuss various phases of the parts jobbing business.

W. M. DeWitt appointed refrigeration division manager for Apex.

Barber Colman Co. of Rockford, Ill. purchases the Uni-Flo Grille Corp.

NEWS publishes first of special Fall issues on parts, this one covering valves and fittings.

Oct. 2:

Sales for eight months top all-time record of 1934, totaling 1,465,700 units.

Tecumseh and Dicer introduce new commercial compressors.

Electric range sales seen as "surprise" appliance market for year, according to NEWS editorial.

Second special issue features condensing units and condensing unit parts.

Oct. 9:

Square D brings out a line of refrigeration controls.

G-E completes move of air-conditioning department to Bloomfield, N. J.

Milwaukee dealers ask utilities to cease home demonstrations of refrigerators.

Motors and controls are feature of the issue.

Oct. 16:

Parts manufacturers and jobbers getting ready for meeting at NEWS open house.

Thomas Evans and J. A. Harlan elected Nema section heads for second terms.

Howard Barber is new manager of Montgomery Ward refrigeration division. Cabinets are editorial feature.

Oct. 23:

Appointments: H. E. Markland as domestic sales manager of Universal Cooler; John S. Garceau as advertising and sales promotion manager of Kelvinator.

NEWS publishes special information on service tools and testing instruments.

Stepped Up



Lee Clark stepped up from the position of sales promotion manager to become Frigidaire's advertising manager.

Oct. 30:

Parts makers and parts supply jobbers draw up plans for permanent organizations at Detroit meetings. Agreed-upon definition of a jobber would bar retail service work.

Jobbers and manufacturers get acquainted at NEWS open house.

Nov. 6:

New all-time peak set with 1,500,000 sales in nine months.

(Continued on Page 34, Column 5)

CELOTEX

CAN SOLVE YOUR PROBLEMS IN CABINET INSULATION

This light, strong insulation—factory fabricated to your exact specifications—speeds assembly and insures lasting satisfaction!

At the Celotex Plant, a department is maintained solely to serve the refrigerating industry. It is specially equipped to furnish Celotex Insulating Board READY FABRICATED to fit ANY type, size or form of cabinet. It supplies Celotex of practically any desired thickness—cut to any size—and bevelled, drilled, grooved, slotted or punched to fit individual requirements accurately.

These ready fabricated Celotex Boards are light, strong, sterilized, odorless. They not only insulate better but also deaden sound and reduce the communication of vibration. They may be had in moisture-resistant natural form or with special coverings for complete moisture-proofing.

We invite you to consult with our specialists concerning your insulation problems. Their experience is extensive and practical.

THE CELOTEX CORPORATION
919 N. Michigan Ave. • Chicago, Ill.

CELOTEX

REG. U. S. PAT. OFF.

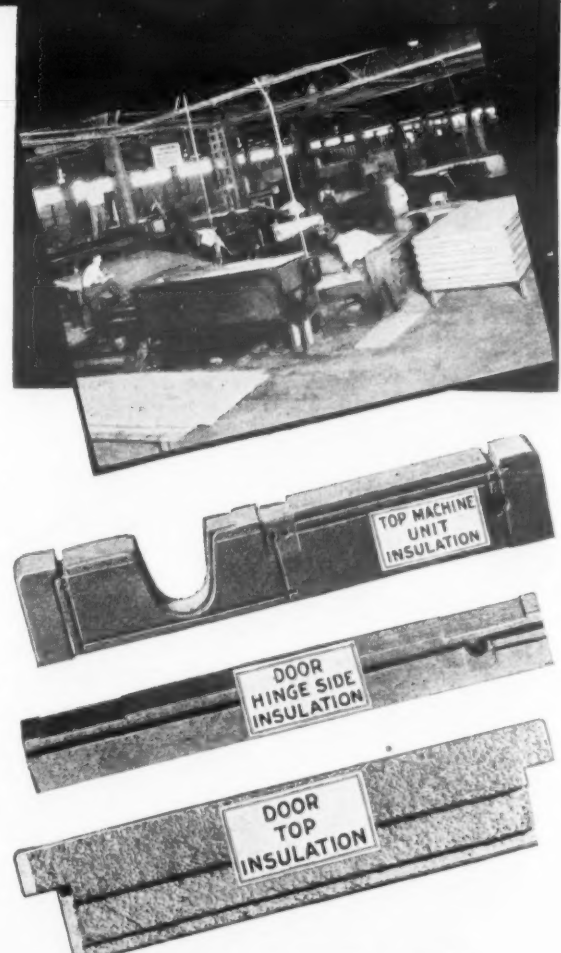
World's Largest Makers of Structural Insulation

All Celotex Cane Fibre Insulating Products are manufactured under the Ferox Process (patented) and effectively resist damage by Fungus Growths, Dry Rot and Termites (white ants). Look for the brand name. Accept no substitutes.

Kelvinator Men Know Him



Well-known throughout the Kelvinator organization as director of sales contests, Walter Jeffrey was last year appointed domestic advertising manager.



Sales Executive



H. E. Markland, former Kelvinator sales executive, heads up sale of household units for Universal Cooler Corp.

1935

(Concluded from Page 33, Column 5)
Revised "Chicago standards" for air conditioning studied by manufacturers.

Premiums with Christmas sales seen as good selling feature.

NEWS starts to publish approved methods for testing and rating mechanical condensing units.

Nov. 13.

Final draft of New York code okays solder joints, limits amount of refrigerant, prevents use of Freon or carrene near open flame.

T. K. Quinn resigns as vice president of General Electric to head advertising agency; replaced by Charles E. Wilson. Other appointments: John A. Hertzler to manage York's air conditioning department; F. D. Peltier as Fairbanks-Morse chief refrigeration engineer; R. G. Nelson as Universal Cooler assistant sales manager.

Nov. 20:

Truscon Steel Co. to sell all of Copeland's 1936 household output.

Celotex completes reorganization.

General Electric consolidates appliance sales departments with P. B. Zimmerman as manager.

Parts makers and jobbers plan joint meeting to work out mutual problems.

Nov. 27:

Grunow to reorganize under section 77B of Bankruptcy Act.

Kelvinator reports year's profits of \$1,200,000, declares extra dividend.

Better Business Bureau issues bulletin warning against misuse of the term air conditioning.

NEWS starts publication of standard method for rating and testing air-conditioning equipment.

Dec. 4:

Universal Cooler profit for year \$47,481. Grunow officers submit plan of reorganization.

Edward Hughes, Norge commercial division chief engineer, killed in auto crash

Dec. 11:

L. S. Morse, York engineer, becomes president of A.S.R.E.

Nema and Edison Electric Institute co-operate to form National Kitchen Modernizing Bureau to promote machine and appliance sales.

Federal officials declare they will prosecute violations and misuse of FHA plans for financing appliance sales.

Dec. 18:

Unfair restrictions on sulphur dioxide, ammonia, and methyl chloride charged at New York code meeting; under set-up, virtual monopoly on approved refrigerants given to du Pont subsidiaries.

Manufacturers of parts complete organization and elect officers.

Dec. 25:

Air conditioning installations in eight major cities far ahead of 1934 figures.

Tax policy on refrigerators found to be inconsistent.

Lemuel R. Boulware elected vice president and general manager of Carrier.

Fedders adds to factory.

1936

Jan. 1:

7,250,000 machines now in use in U. S. homes, according to NEWS estimates; saturation point of wired home market is 34.2%.

Estimated 1935 sales 1,700,000 units.

All General Electric models for 1936 have sealed unit.

New Williams air conditioner employs an absorption-type refrigeration unit.

Jan. 8:

George F. Taubeneck, NEWS editor, starts world tour from Detroit, Jan. 8.

Grunow re-organization under way; company authorized to buy 1936 materials.

Features of new Kelvinators include 5-year protection plan, built-in thermometer, certificate of operating cost, and two compartment refrigeration with forced-draft circulation in Super Deluxe models.

Jan. 15:

Leonard introduces five-year service plan in new line. Stewart-Warner models have the Sav-a-Step. Sparton adds new accessories.

George McIntyre becomes vice president of Norge.

Fairbanks-Morse moves appliance operations to Indiana.

Jan. 22:

Westinghouse "Golden Jubilee" model has unit mounted in base.

Jan. 29:

Delco Frigidaire Conditioning Corp. formed to handle General Motors air conditioning units.

Universal Cooler decides to sell its new household refrigerator, featured by "double downdraft" evaporator, direct to department stores.

George Moister appointed advertising manager for Universal Cooler.

Feb. 5:

More than 250 exhibits feature Chicago air conditioning exposition as 30,000 attend showing.

Final sales record for 1935 shows 1,688,600 units sold.

W. D. McElhinny, Frigidaire wholesale division manager, dies in Dayton Feb. 1. Grunow goes to 5-year service plan.

Directs G-E Activities



Charles E. Wilson, vice president, was placed in charge of the G-E specialty appliance division following the resignation of T. K. Quinn.

Hermetic unit optional on 1936 Crosleys. Qualifications for a jobber discussed at joint meeting of parts makers and suppliers.

FHA orders 10% down payment on all electric refrigerators bought under plan; officials push fight against salesmen making misuse of the plan.

Misuse of credit facilities of FHA scored in NEWS editorial.

55 makers of commercial refrigerators report sales of 23,031 units in 1935.

Feb. 19:

Mayflower manufacturing and distribution turned over to founders of company, Harry J. Hunt and Fred C. Geiler.

Faulty credit information judged source of Detroit FHA time payment trouble.

D. G. Spahr appointed eastern division manager of Delco-Conditioning.

Sparton adopts 5-year service plan.

Feb. 26:

Frigidaire adopts hermetic unit as standard and launches "proof-selling" campaign, using "meter-miser" as economy lead.

New Copeland models have "classic" lines and 2-cylinder compressor.

"Master Service Manual" published in book form by NEWS for use by service men.

Five-year service warranty offered on "Coldspots."

March 4:

Norge offers 10-year guarantee on Rolator, five-year plan on other parts.

Macy's again accused of "bootlegging" refrigerators from New Britain, Conn., dealer.

Stewart-Warner makes 5-year service plan optional.

March 11:

Prices, guarantees, and trade-ins judged greatest 1936 merchandising problems at General Electric "clinic" on department store retailing of refrigerators.

Montgomery Ward scales down prices in introducing new line.

January record of 125,400 household shipments confirms predictions.

Brunner joins Nema commercial section.

Homer Kunkler joins Stewart-Warner sales staff.

Westinghouse air conditioner production moved to East Springfield.

March 18:

1,649 of 2,250 department stores covered in survey handle electric refrigerators.

Westinghouse starts kitchen clinics.

Crosley offers 5-year service for \$5 extra.

March 25:

Electric refrigerators and appliances eliminated from new FHA bill.

Fairbanks-Morse joins Refrigeration Division of Nema.

Kelvinator splits franchises on commercial and air-conditioning lines.

April 1:

February sales total 186,200, jump of 45% over same month, 1935.

Kitchen Modernizing Bureau programs underway in 38 states.

Editor's round-the-world journey intended to probe possibilities of extending foreign trade in electric refrigerators and air conditioning, says NEWS editorial.

Copeland offers 5-year service plan.

Appointments: J. J. O'Neill as merchandising manager of Leonard; G. V. Pollard as works manager for Kelvinator.

April 8:

Nema report shows 43% rise in commercial condensing unit sales during last two months.

Mills Novelty offers line of commercial units.

Frigidaire largest newspaper advertiser within industry during 1935.

Peerless introduces "Humid-Pack" evaporator.

Commercial units, overcoming effect of inopportune-timed markets of early thirties, making comeback in spring sales.

New York code hearing again puts spotlight on refrigerants.

Appointments: Lowell McCutcheon as manager of wholesale division, Roy E. Smithson as manager of commercial products sales, and Virgil Hetzel as manager

of installation and service division, for Frigidaire.

April 15:

Commercial installation must cost \$2,000 to qualify for FHA loan, according to amended rules.

Industry's 1935 national magazine advertising 13% above 1934 mark.

Powel Crosley, III, elected vice president of Crosley Radio.

April 22:

Substitute mechanical refrigeration code, with systems grouped according to total weight of refrigerant required for proper operation, proposed to Chicago city council.

Grunow reorganization under million-dollar RFC loan approved by Federal court.

C.I.T. announces "6%" plan on appliance sales.

April 29:

Detroit city council rules service men installing multiple systems must be licensed and post \$1,000 bond.

Federal Trade Commission issues complaint against Coolerator, ice refrigerator manufacturer, for false and derogatory statements concerning dependability and performance of electric refrigerators.

Court decision invalidates Auditorium by-pass patents.

May 6:

Household sales for March break records with 285,900 total; 21,346 commercial jobs sold during month.

May 13:

Chrysler moves Airtemp production to Dayton plant.

Appointments: Thomas W. Berger as general sales manager for Crosley; Walter A. Bowe as advertising manager for Carrier.

May 20:

March air-conditioning order bookings total \$3,477,752, increase of 33% over February.

Electrical Association of New York offers five-year financing plan to encourage apartment installations.

May 27:

ACMA members adopt applications code: R.M.A. men pass standard warranty and rating rules for certification of condensing units.

Cincinnati distributors brand long-term guarantees "most dangerous situation" in refrigeration merchandising.

Refrigeration division of Wholesale Radio Co. sold to Harry Alter.

Standard Air Conditioning introduces line of sectional air-conditioning equipment.

June 3:

April sales of 321,300 units set all-time monthly high for industry.

Kelvinator outlines plans for construction of 100 "Kelvin Homes," showing air-conditioning installation possibilities in low-cost housing.

Rackliffe Bros., Kelvinator distributor, awarded damages in suit against dealer who "bootlegged" refrigerators to Macy's.

June 10:

Frigidaire formally announces that it will sell parts to independent service men through its own distributors.

Self-contained ice cream cabinet sales show best gain as commercial units break April selling records.

ACMA warranty provides one-year defective parts replacement guarantee; R.M.A. establishes same warranty on condensing units.

June 17:

Air-conditioning sales for April 6% below March peak.

Opinions of readers split over Grunow's "scare" psychology, "letters to the editors" reveal.

Frigidaire's decision to market own replacement parts to independent service men indicative of trend toward ending distribution of parts through exclusive channels.

A. J. Bartley made general manager of Dry-Kold.

June 24:

Westinghouse makes marked reductions in size and weight of large condensing units for air conditioning.

NEWS takes stand editorially that "all the news that's fit to print" policy applies to acceptance of Grunow advertising.

July 1:

Department store appliance merchandisers ask two-year unqualified guarantee to replace customary five-year replacement warranty; National Retail Furniture Association claims "guarantee advertising misleading and burdensome."

May sales skyrocket to \$44,200 units.

Commercial refrigerator manufacturers hit easy payment plans, and advocate 20% down, 6% minimum, for time sales.

Fred L. Riffin elected president of Mueller Brass Co.

July 8:

Coolerator "Why Ice Is Best For Refrigeration" booklet flayed at Chicago hearing; Grunow's "Worse Than Fire" advertisement introduced as back-handed evidence by ice box firm at Federal Trade Commission hearing.

Mussolini and Stalin "yank" delegations from International Refrigeration Congress at The Hague; NEWS editor outlines progress of electric refrigeration and air-conditioning industries in U. S. to conclude.

Peerless introduces air-conditioner line. NEWS editorial urges use of "dramatic appeal" in selling air conditioning.

Evaporative condensers marketed by Buffalo Forge Co. and The Brus Co.

July 15:

May air conditioner orders total \$4,415,-

Veteran with Frigidaire



Roy Smithson has held many positions of importance with Frigidaire, and is now manager of commercial product sales.

681, with self-contained type showing biggest gain.

Dealers lament price cutting trend; NEWS advises trade buyers are not all susceptible to mark-down inducements and will demand quality product.

July 22:

Food preservation experts who conducted tests for Norge and Frigidaire disclaim Coolerator's dehydration claims against electric refrigeration; ice cube impurity allegations refuted by expert testimony.

July 29:

Ohio dealers plan to use new fair trade law in effort to maintain established list prices.

Household sales pass 1,500,000-mark half way through year.

Kelvinator adds washer and electric ironer lines.

Perfection Refrigeration Parts Co. starts to make line of valves and fittings.

Aug. 5:

George F. Taubeneck, NEWS editor, returns from 35,000-mile trip around the world lasting seven months; visits 32 countries, 67 major cities.

Federal Court approves Grunow reorganization plans and receivers hand over control to officers of the reorganized concern.

E. R. Capewell, Inc., one of first independent manufacturers of compressor replacement parts, purchased by Perfection Refrigeration Parts Co.

Aug. 12:

Commercial Refrigeration Section of Nema adopts standard system of drinking water temperatures to be followed in estimating water cooler installations.

Oklahoma City reports \$250,000 air-conditioning installations to date in 1936.

Aug. 19:

Sales of all-electric kitchens advance in 44 cities as National Kitchen Modernizing Bureau extends displays and promotion throughout 28 states.

Gibson pledges cooperation to Birmingham, Ala., Electric Refrigeration Bureau in bureau's move to reduce guarantees to one year.

Aug. 26:

Final figures on exports for 1935 reveal 12% gain, with United Kingdom and South Africa best customers of U. S. refrigerator firms.

Refrigeration Division of Nema starts certification of commercial units according to A.S.R.E. Standard test and rating methods.

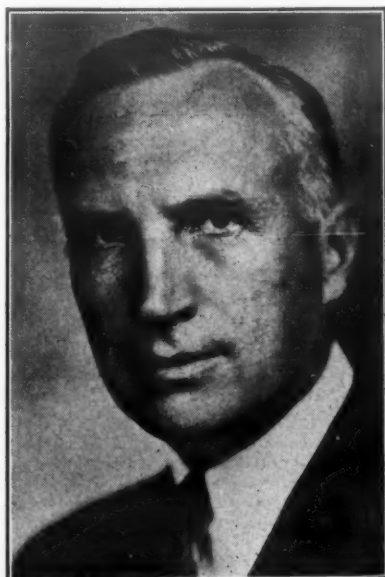
Sept. 2:

Westinghouse low bidder among eight manufacturers submitting bids to Housing Division of Federal Emergency Administration of Public Works on electric refrigerators for 34 housing projects.

Survey of all firms shows 1,737,100 units sold in first seven months of year, with July figures 33% above same month in 1935.

Thirteen major manufacturers spend \$1,855,668 on magazine advertising in first six months of 1936.

Heads Mueller Brass



Fred L. Riffin was recently elected president of Mueller Brass Co.

Some refrigerator manufacturers guarantee certain working parts for a long time.

... And then give that refrigerator an eye-appeal finish that is exceedingly temporary.

You'll pardon us if we keep our eyes on the stock quotations of manufacturers who do a more complete job.

PORCELAIN ENAMEL INSTITUTE, INC.
612 NORTH MICHIGAN AVENUE, CHICAGO

Engineering

Morse Traces Development of Refrigerating Machinery Using Freon-12

By L. S. Morse,* Executive Engineer, York Ice Machinery Corp.
President, The American Society of Refrigerating Engineers

DICHLORODIFLUOROMETHANE (CCl_2F_2), more commonly known as Freon-12, was introduced to the refrigerating industry about 1931, but so little was known of its practical performance as a refrigerant that we are not surprised at the apparent lack of recognition given it among the papers presented at the Sixth International Congress of Refrigeration held in Buenos Aires in 1932. At the present time we have had the benefit of some five years of experience and believe that we can point out some interesting facts pertaining to the rational development of Freon-12 refrigerating machinery and apparatus.

Freon-12 was originated in the United States as the result of a thorough and intensive program of chemical research and experimentation. The outstanding objective of the program was the production of a refrigerant with a minimum of hazards, optimum physical and thermodynamic properties, and practical for all types of refrigeration—that is, for the large industrial plants as well as for the small household refrigerator units.

Characteristics of Freon

The characteristics of Freon-12 can be summarized as follows:

1. It is colorless and has a boiling point of -21.7°F . at standard atmospheric pressure. It is odorless in air at concentrations of less than 20% by volume. The vapor, in all proportions, is non-irritating to the eyes, nose, throat and lungs.

These attributes make it an ideal gas in eliminating the panic hazard should it escape from the refrigerating system into a populated space.

2. It appears to be non-toxic in concentrations up to at least 20% by volume (63 lb./1000ft.³) for an exposure of two hours.

3. In contact with flame and very hot surfaces (550° – 1022°F). Freon-12 is decomposed, with the formation of toxic products, which are exceedingly irritating, and therefore give adequate warning of their presence in the air at concentrations of a very low order. The danger from the toxic products of dissociation depends upon exposure, but under ordinary conditions in ventilated places serious danger to life is not involved.

It is to be noted, however, that in the presence of open coil hot resistance wire units, such as are used in electrical ranges for cooking, which are heated to a cherry red heat (750° – 1382°F), practically no toxic decomposition products are formed during a period of exposure of the order of one-half hour in a room without any ventilation.

4. The liquid or vapor is non-flammable and non-combustible and its air mixtures are not capable of propagating a flame.

5. It is non-corrosive to all metals commonly used in refrigerating machinery apparatus, but is not recommended for magnesium alloys nor for aluminum containing magnesium, especially in systems where water may be present.

6. It is stable and will withstand indefinitely repeated cycles in changes of phase and state without dissociation or variation of its properties.

With these appealing chemical characteristics what are its physical and thermodynamic properties?

*Paper presented at the Seventh International Conference of Refrigeration, June 16-29, 1936, The Hague, Holland.

Table 1—Characteristics of Refrigerants

(Standard Conditions— 5°F . Evaporator, 86°F . Condenser)

	Freon-12 CCl_2F_2	Carbon Dioxide CO_2	Ammonia NH_3	Methyl Chloride CH_3Cl	Sulphur Dioxide SO_2
Boiling point, $^\circ\text{F}$. at atmos. press.	-21.7	-108.4	-28.0	-10.6	14.0
Abs. press., lb./in. ² at 86°F	107.9	1039.0	169.2	95.53	66.45
Abs. press., lb./in. ² at 5°F	26.51	334.4	34.27	20.89	11.81
Total heat of saturated vapor in 5°F . evaporator, B.t.u./lb.....	78.79	102.14	613.35	195.3	183.49
Total heat of liquid leaving 86°F . condenser, B.t.u./lb.....	27.72	45.45	138.9	46.6	42.12
Refrigerating effect, B.t.u./lb.....	51.07	56.69	474.45	148.7	141.37
Pounds of refrigerant per minute per ton of refrigeration.....	3.916	3.528	.422	1.345	1.414
Volume of liquid, ft./lb. at 86°F012	.027	.027	.018	.012
Volume of liquid, in./min./ton of refrigeration.....	83.9	162.8	19.6	41.7	28.9
Volume of vapor, ft./lb. at 5°F	1.485	.267	8.150	4.529	6.421
Volume of net piston displacement, ft./min./ton of refrigeration.....	5.815	.943	3.436	6.091	9.084
Refrigeration, B.t.u./ft. of piston displacement.....	34.4	212.0	58.2	32.8	22.0

Radiating Ribs

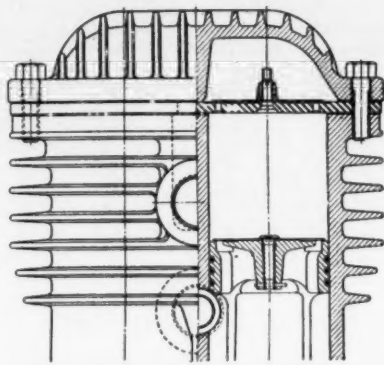


Fig. 1—Heat of compression of Freon is generally dissipated by radiating ribs on the head cast integrally with the compressor.

Refrigerant Flow And Pipe Sizes

Saturated Freon-12 vapor is approximately three to five times more dense than the other refrigerants listed, with the exception of carbon dioxide. The gas velocities through the suction and discharge valves of Freon-12 compressors must be sufficiently low to prevent excessive pressure drop and wire drawing, which would materially reduce the operating efficiency. This requires not only correctly designed valve openings and port areas, but stream line flow or hydraulically contoured passages for the flow of the gas into and out of the compressor. This precaution of minimum restriction to flow applies alike to mains, connections, shut-off valves, fittings, etc.

One manufacturer states that acceptable velocities in Freon-12 compressors are from 2500 to 3000 ft./min. through the suction valve openings, based on the suction valve being open one-half a complete revolution; and from 3000 to 3500 ft./min. through the discharge valve, based on the discharge valve opening after two-thirds of the compression stroke is completed. One-third of the cylinder displacement must pass through the discharge valve in one-sixth of a revolution.

Without going into a technical discussion of all the factors entering into the proper size of piping to eliminate excessive pressure drop, let it again be stated that the weight, quantity, and other characteristics of

Freon-12 require larger pipe mains than do the other refrigerants.

It is well known that the capacity and efficiency of any refrigerating installation depends to a great extent on maintaining the minimum friction loss in the suction line between the evaporator and the compressor. Hence particular attention should be given to the size and length of the suction main.

The manufacturers of Freon-12 state that the limits of Freon-12 vapor or gas velocity in feet per minute through the piping should be approximately as follows, although best results will be obtained when the velocities are reduced 20% or more:

	Large Pipe Sizes	Small Tubing Sizes
Suction line	2,750 to 3,750	800 to 1,800
Discharge line	3,750 to 4,750	1,750 to 2,250

The limiting velocities of Freon-12 in liquid lines are between 80 and 200 ft./min., dependent on tonnage and size of pipe.

In other portions of this paper are mentioned the importance of cleanliness in the system. This statement applies especially to the interconnecting pipes, valves and fittings. Freon-12 is a cleanser and solvent and will remove and carry along with it any deleterious matter from the connections.

Particular attention should be given to each joint in Freon-12 installations to see that they are free from oil and from particles of dirt, to prevent leakage of the refrigerant.

For small mechanical condensing units dehydrated copper tubing is generally used. Flared joints with soft annealed tubing are often used on

Another Valve

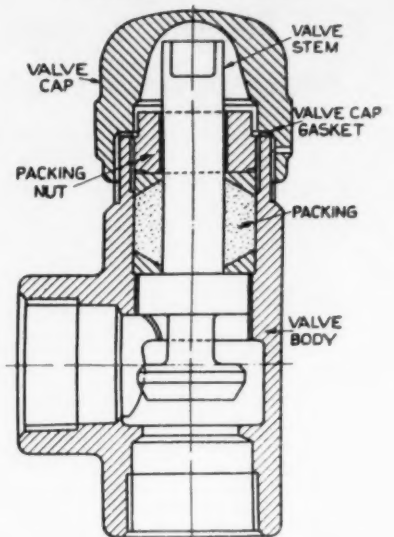


Fig. 3 demonstrates a double packed valve with seal nut which is used in some Freon machines.

% in. O.D. and smaller sizes, and soldered or brazed joints on the larger sizes. Shut-off valves are generally of the diaphragm packless type as shown in Fig. 2.

In these small installations it is advisable to furnish fine meshed filters in the liquid lines to prevent foreign matter from interfering with the action of the liquid control valves.

For the larger installations scale-free steel pipe is generally used with as few flanged joints as possible. This is accomplished by welding in the field not only the abutting lengths of pipe, but also steel elbows or "tube turns" to pipes. Whenever pipe flanges are used they may be welded. If threaded connections are used, clean sharp close-fitting threads are required and the joint made up with litharge and glycerine, or some other pipe compound unaffected by Freon-12 and oil.

Leakage of valves through stuffing boxes may be prevented by the packless type or by the double packed type with seal nut, as in Fig. 3.

Condensers and Evaporators Considered

In the design of condensers, evaporators and other heat transfer apparatus (Continued on Page 36, Column 1)

Packless Valve

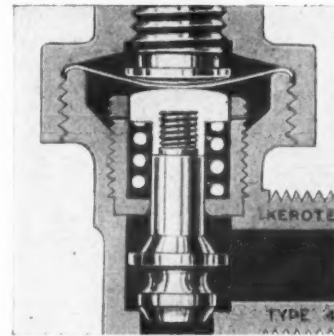


Fig. 2 shows construction of diaphragm packless type valve. Illustrated, Kerotest type 417.

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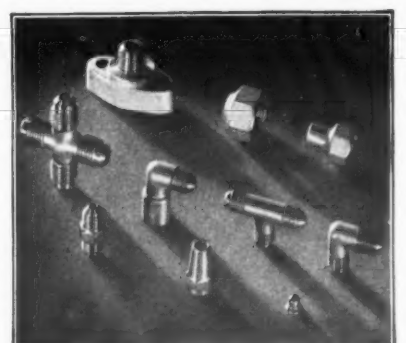
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VALVES



Oil Problems Similar For Freon-12 and Methyl Chloride

(Continued from Page 35, Column 5)
ratus, consideration must be given other properties of Freon-12, such as thermal conductivity and viscosity. The experience gained in laboratories and from actual field installations have led most manufacturers to furnish approximately twice as much condensing surface for Freon-12 as ammonia would require at the same mean temperature difference and tonnage.

In a comparison of evaporators it is not quite so easy since dissimilar methods of design are used. Ammonia evaporators normally were flooded, whereas Freon-12 evaporators have been made "series feed" to effect return of the oil to the crankcase, or of the spray type to cut down the refrigerant charge and cost.

The lubrication of a Freon-12 compressor is similar to that of any other compressor using a refrigerant such as methyl chloride, which is completely miscible with mineral oil. A portion of the oil eventually will pass along from the compressor to the condenser and on through the liquid line to the evaporator. In the small tube evaporator in which the liquid is fed in series we have a perfect continuous still, concentrating oil which is carried along with the evaporated gas so there is no oil logging of the evaporator. However, in the flooded or spray type, the still action leaves the oil behind, increasing the concentration in the evaporator to a point where the evaporating efficiency is impaired, requiring periodic purification. This is done usually by operating the evaporator as a "batch still," distilling off the Freon-12 and withdrawing the residual oil.

Mineral oil absorbs Freon-12, according to the oil characteristics (pour point and viscosity), its temperature, and the operating pressure. Lighter oils absorb slightly less and heavier oil slightly more Freon-12 than the oil designated in the above mentioned figure. This is an important consideration in the study of lubrication and crankcase design.

It is very important that compressors and all other apparatus used in a Freon-12 refrigerating system be thoroughly cleaned of all dirt, scale and foreign matter, and every trace of oil, soldering flux and washing compounds removed. Freon-12 is a solvent, and physically dissolves and loosens such foreign matter which otherwise would be carried along by the liquid and vapor and deposited at vital points, such as valve seats, if provision were not made for its interception. Therefore filters with

Table 2—Results of Air Conditioning Tests, May 1933—210-Ton Unit

Run No.	Compressor R.p.m.	Suction Pressure lb./in. ² Gauge	Suction Temperature °F.	Discharge Pressure lb./in. ² Gauge	Discharge Temperature °F.	Compressor Motor kw.	Total kw.	Condenser Water G.p.m.	Condenser Water On, °F.	Condenser Water Off, °F.	Chilled Water G.p.m.	Chilled Water On, °F.	Chilled Water Off, °F.	Chilled Water Tons
Col. 2	3	5	7	9	10	22	28	34	35	36	52	49	50	53
G-1	214	37.75	39.8	131.7	123	181.0	192.6	845	88.3	95.9	683	52.4	44.0	238.5
G-2	214	37.85	40.6	129.5	126	158.0	168.8	850	88.2	94.9	672	51.4	44.0	209.0
G-3	214	37.9	40.5	130.0	126	146.5	156.4	850	88.8	95.1	672	50.7	44.0	191.0
G-4	214	38.3	41.0	120.6	130	124.9	135.1	850	88.3	93.7	671	49.3	43.6	161.0
G-5	214	40.1	42.3	121.5	128	103.6	113.6	844	88.3	92.9	672	49.2	44.5	131.5
G-6	214	40.1	42.4	120.5	134	87.0	96.5	850	88.2	91.5	689	47.4	43.9	100.5

fine mesh screen of large area, designed for easy disassembly to permit cleaning of the screen, should be provided to protect the compressor and all automatic regulating valves.

It is necessary also that the compressor be thoroughly dried of all moisture. Water is insoluble in Freon-12 and would be carried to the expansion orifice and freeze into ice and cause a loss of refrigerant control. Many of the manufacturers put driers in the system to draw out the water vapor.

Since Freon-12 is odorless, colorless, non-irritant and non-toxic, the presence of a leak is not readily observed nor located. However, such leaks may be readily detected by means of a special alcohol pressure-type blow torch. This device makes use of the phenomenon that a chloride in contact with flame in the presence of a piece of copper discolors the flame. The special alcohol torch is provided with a copper screw in the flame tube that is kept hot by the flame. The high velocity of the entering alcohol vapor induces a slight flow of air in a rubber sampling tube connected to the flame tube. When the exploratory end of the sampling tube sucks in air containing as little as .01% Freon-12, the normally colorless flame becomes a bright green.

We have gone into considerable detail in the foregoing statements with reference to the chemical and physical properties of Freon-12, and have made brief mention of its thermal properties in order that the reader, who may not be familiar with this new refrigerant, may understand that the proper design can very easily be anticipated by an experienced refrigerating engineer. But it is more important to prove by actual test whether the theoretically calculated results have been actually obtained.

Space limitations on this paper will not permit detailed description of features in the design and construction required by the characteristics of this refrigerant. But we will attempt to chart the general trend by a series of illustrations.

The most common design of Freon-12 compressors in the United States is along the lines of the single-acting vertical enclosed type, though at least one firm uses the horizontal

Partial By-Pass Ports

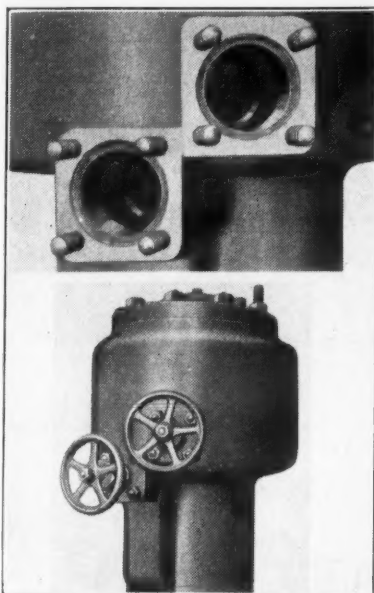


Fig. 4 shows partial by-pass ports which are used to cut down capacity to any point desired.

double-acting type. Because of the popular reception of the mechanical condensing unit for other refrigerants, it was quite natural to develop this design for Freon-12 incorporating such features as theory and practice prove desirable, particularly those of proper valve areas and suction and discharge connections.

A mechanical condensing unit is a specific refrigerant machine combination for a given refrigerant, consisting of a motor-driven compressor for operation at a given speed, a condenser, a liquid receiver and the regularly furnished accessories. In Freon-12 units the motor sizes may range from 1/4 to 25 hp. Two compressor cylinders usually are employed, but multi-cylinders in straight or V arrangement also are used.

Condensers for the smaller units are made of finned tubing for air cooling with disc fan, and have separate liquid receivers. Larger units from about 2 hp. size use water cooled condensers, some with double tube construction with separate liquid receivers, and others with shell and coil or shell and tube type, the water circulating through the coils or tubes. The lower part of the condenser in this type serves as a liquid receiver.

Advantages claimed for the mechanical condensing units, are:

1. Compactness in space requirements.
2. No field assembly of parts constituting the unit.
3. Operated and tested at factory under definite refrigerant loads.
4. Generally charged with refrigerant and oil at factory.
5. Assurance of properly balanced parts for high side unit for specific duties.

The larger size refrigerating machine resembles in many respects the well known ammonia enclosed type, though the water jacket usually is omitted as it is not necessary for the usual compression ratios. It is essential that large valve areas and proper size gas passages and connections be incorporated in the design, to obtain efficient operating conditions.

The table below shows the sizes and speeds of enclosed Freon-12 refrigerating machines built by one manufacturer.

Size of Compressor	R.p.m.
8" bore x 6" stroke	2 cyl. 475
10" bore x 7 1/2" stroke	2 cyl. 400
12 1/2" bore x 9" stroke	2 cyl. 360
15" bore x 10" stroke	2 cyl. 360
15" bore x 10" stroke	4 cyl. 360

An important requirement of these large machines is an ample supply of filtered oil available instantly upon starting. One machine has a recirculating system with geared pump providing a positive pressure lubrication for all bearings and a secondary system of forced feed type supplying adjusted multi-point lubrication to cylinder walls, with fresh oil only.

This machine may be used with any type of prime mover, but is particularly well adapted for direct connection to synchronous motor drive, the rotor being keyed to the extended end of the crankshaft. Such a drive requires that there be no differential pressure on the piston in

starting. This is accomplished by opening a valve in a cored passage between discharge and suction chambers.

This manufacturer also features partial by-pass control so that the machine may be operated at reduced capacity when a reduction in load occurs, without changing the compressor speed. Fig. 4 shows these partial by-pass ports, which may be located to suit any desired capacity reduction, though 25% and 50% reduction are generally used. When by-pass valve is off its seat there is an open passage between cylinder and suction chamber. As piston starts on compression stroke gas flows back into suction chamber and compression does not begin until piston over-travels by-pass port. With this capacity reduction device, the same rate of capacity reduction is obtained under all operating pressures with only slight loss in efficiency, due to constant machine friction at the reduced capacity and a small amount of gas "wire drawing" through the ports.

Both the starting and the capacity reduction by-pass controls are furnished for either hand or automatic operation.

This type of capacity reduction device was developed for constant speed Freon-12 compressors to maintain a required suction pressure with variable loads. It can of course be adapted for compressors for other refrigerants.

The larger Freon-12 refrigerating machines are provided with shaft stuffing boxes in which semi-metallic packing is used and hand adjusted to take care of leakage. Unquestionably the metallic seal is the better method and though there were many difficulties to overcome with this type of seal in the larger sizes the trend is now toward their application.

The shaft seal is used with complete satisfaction with practically all of the mechanical units. Fig. 5 shows one method in which an independent hardened steel collar (A) is surrounded by a U-shaped synthetic rubber gasket (B) which rests against the shaft shoulder. This gasket grips the steel collar making it turn with the shaft. Great care is taken in the selection of material and finish of the bronze ring attached to the bellows, to present and maintain a leak-proof rubbing surface (C).

Another seal device termed the "Balanseal" (patented) is claimed to maintain practically constant pressure on the seal surface regardless of crankcase pressure, because of the balanced effect created by the diaphragm across the fulcrum point.

Bellows Shaft Seal

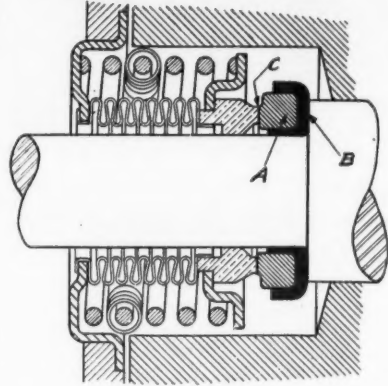


Fig. 5 illustrates construction of bronze ring bellows shaft seal.

Number 1 position, in the exaggerated sections of Fig. 6, shows the shape of diaphragm in the shop assembly, at atmospheric pressure in crankcase with a predetermined initial pressure on the seal surface. Number 2 position shows positive crankcase pressure position; the pressure on the seal face is not materially changed because of the properly located fulcrum. Number 3 position shows the effect of a vacuum in the crankcase. The resistance of the diaphragm prevents excessive pressure on the seal face. The spiral arrangement of the oil pockets in the face of the seal actually pumps a small amount of oil through the bearing surface, properly oiling it.

In tubular evaporators used for cooling and conditioning flowing air the total length of the runs for the refrigerant must be such as to keep pressure drop to a reasonable point. The designer decides on the maximum pressure drop the installation will stand and arranges the length of the refrigerant passage to suit. Fig. 7 shows the arrangement of distributing heads placed between thermal expansion valves and coils, with sufficient distributing connections to each evaporator coil section to properly proportion the flow of refrigerant and to obtain the desired pressure drop through the section. Without such distributing head individual expansion valves would be necessary.

Many of the large air-conditioning installations, because of owners' preference or safety code restrictions, employ the indirect system, in which water is cooled by the refrigerant and the chilled water is circulated (Concluded on Page 37, Column 1)

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Count 20 points each for the correct answers to the following questions. Can you score 80? Don't look now, but the answers are on page 42.

1. The first official automobile race was held in:

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Daytona Beach Churchill Downs

2. Which of these men is the founder of the Democratic Party:

Felix Frankfurter Thomas Jefferson
Alexander Hamilton Henry Cabot Lodge

3. Why are inside and outside of Bundy Tubing free from scale and oxides?

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The last act in "Faust" A spot in the Atlantic

4. When you mention the "Devil's Hole" you mean:

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Freon-12 Adaptable For Use in Indirect Cooling Systems

(Concluded from Page 36, Column 5) through coils or sprayed directly in the air washer for the purpose of cooling and conditioning the air.

Fig. 8 shows diagrammatically an arrangement of the machinery and apparatus for a Freon-12 water-cooling system. Against the high cost of this refrigerant, the design aims to reduce to a minimum the refrigerant charge in the system.

There is no accumulation of liquid in the condenser as it drains to the float regulator vessel located below the condenser. The float regulator, serving as an expansion valve, automatically discharges all liquid condensed to the shell and tube water cooler. The normal liquid level in the evaporator is below the bottom row of tubes.

The liquid is pumped through a spray header inside the shell and above the top row of tubes. The quantity of liquid circulated is more than the liquid evaporated to ensure sufficient and uniform sprayed liquid over the entire tube surface. The liquid which is not evaporated flows to the pump chamber, together with

Freon-12 Water-Cooling System

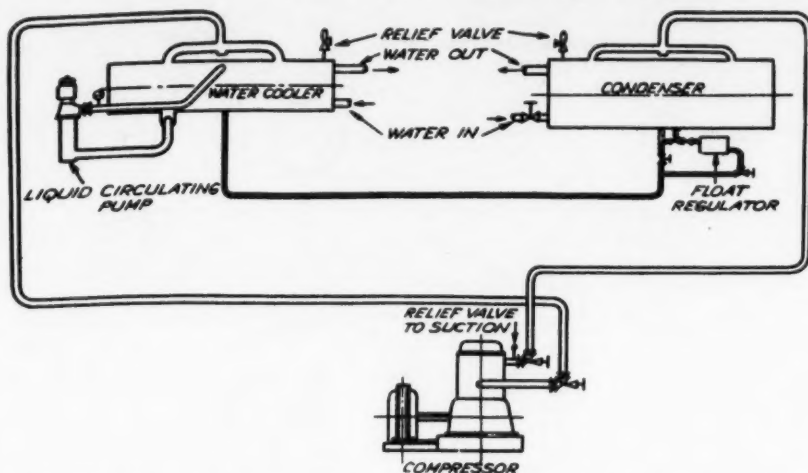


Fig. 8—Design of water-cooling system planned to cut amount of Freon-12 needed.

performance test of the first large refrigerating plant using Freon-12 as the refrigerant. This plant was installed in Washington, D. C., in 1932 for the purpose of air conditioning one of the Government buildings. At the time of its installation there were practically no operating data available other than those which had been

following loads: 100%, 90%, 80%, 70%, 60%, and 50%, when used to cool water to a temperature of 44° F. and when using condenser water at not less than 88° F.

Tests:
Operating tests will be required after the installation of each complete refrigerating unit, consisting of condenser, compressor, and evaporator. Such tests shall include operation under the above specified conditions and loads.

The above tests shall be for the purpose of demonstrating the total specified capacity (330 tons), satisfactory mechanical operation, and power input under the conditions specified above.

For the purpose of this paper we shall mention only the machinery and apparatus in the refrigerating cycle, as specified in the successful bid:

1. Compressors

210-ton unit.
One 15-in. x 10 in., 4-cylinder v.s.a. semi-enclosed poppet valve Freon-12 compressor at 214 r.p.m., with 25% and 50% unloading by-passes on all cylinders, driven by 225 hp. 100% p.f. direct connected synchronous motor.

120-ton unit.
One 15-in. x 10-in., 2-cylinder v.s.a. semi-enclosed poppet valve Freon-12 compressor at 250 r.p.m., with 25% and 50% unloading by-passes, driven by 125 hp., 100% p.f. direct connected synchronous motor.

2. Condensers

210-ton unit.
Two stands of shell and tube condensers with two shells, 19 in. diameter by 15 ft. 3 in. long, in series, with 3/4-in. O.D. Muntz metal tubes. The Freon-12 condenses in the tubes and the water circulates outside the tubes in a cross flow over 18 baffles and gives an average water velocity of 185 ft./min.

120-ton unit.
One stand of condensers the same as above.

3. Evaporators

The evaporators consist of six spray type Freon-12 water coolers with liquid Freon-12 recirculating pumps. Each shell contains 3/4-in. O.D. Muntz metal tubes. The coolers are connected in parallel and four are piped to the 210-ton unit and two to the 120-ton unit, since the two refrigeration units are separate and independent systems. The shells are rated at 44° F. water off for 1,360 g.p.m. at full load.

The two refrigerating systems were guaranteed to have the following power requirements which includes power to the compressors, Freon-12 liquid pumps, and exciter.

210-Ton Unit					
Percent load	100	91	79	67	50
Tons refrigeration	210	191	166	141	105
Power input kw./ton.	0.910	0.940	0.950	0.990	1.060
Comp. power input kw./ton.	0.85	0.875	0.876	0.902	0.931

120-Ton Unit					
Percent load	100	89	78	69	50
Tons refrigeration	120	107	93.5	83	60
Power input kw./ton.	0.930	0.970	0.990	1.070	1.110
Comp. power input kw./ton.	0.855	0.885	0.892	0.962	0.958

to maintain a relative humidity not exceeding 50% in the space conditioned during the heating season.

Refrigerating Apparatus:

The total refrigerating capacity shall not be less than 330 tons. The compression system shall be one of the following types: reciprocating, rotary, or centrifugal using either methyl chloride, dichlorodifluoromethane, or methylene chloride as a refrigerant.

There shall be two motor-driven refrigerating machines having a combined capacity of not less than 330 tons, approximately 110 and 220 tons respectively.

Operation:

Each bidder as a part of his proposal shall furnish a guarantee that the power input in kwh. to each refrigerating unit consisting of condenser, compressor, and evaporator, will not exceed a given amount.

The amount shall be based upon the operation of each refrigerating unit, complete, at approximately the

'Balanseal' Type Shaft Seal

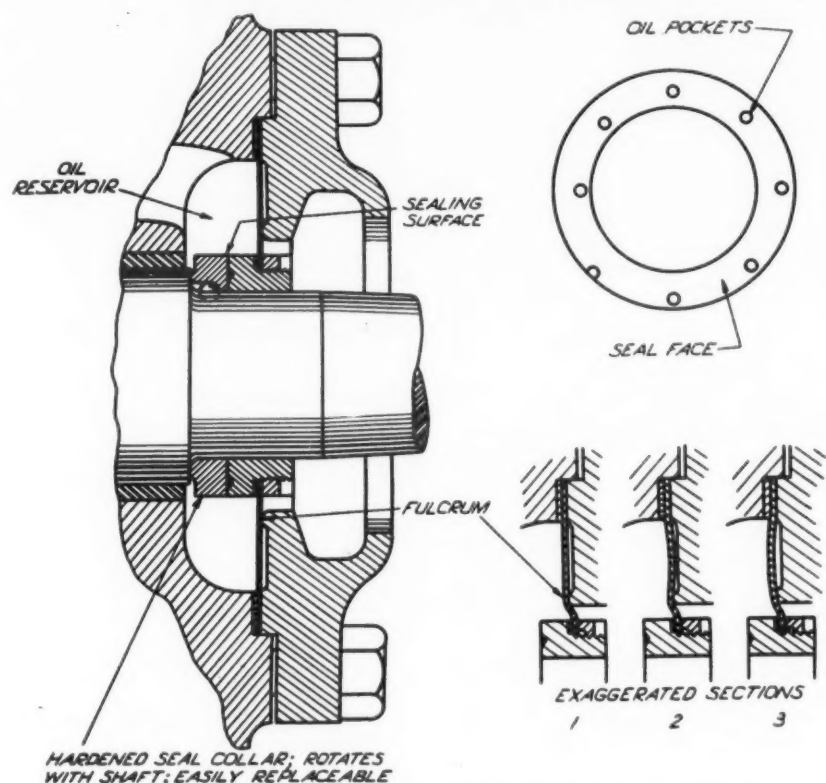


Fig. 6—This patented type of shaft seal is claimed to maintain practically constant pressure on seal surface. For explanation of exaggerated sections, see text.

the liquid from the condenser, and is recirculated.

This type of evaporator for cooling water or brine, though applicable for any refrigerant, is particularly well adapted for Freon-12. The primary advantage is minimum charge and cost of refrigerant, a prime factor in Freon-12.

A secondary advantage is gained from the spraying of liquid over the tubes instead of the commonly used flooded evaporator, as the rate of heat transfer is materially increased.

In concluding this discussion it seems pertinent to include an actual

obtained in the contractor's test laboratory. The performance guarantees had to be calculated from the known characteristics of the refrigerant, from results obtained in plants of smaller capacity, and from the builders knowledge of the efficiency of compressors with other refrigerants.

General Contract Obligations:

1. To maintain a temperature not exceeding 75° F. and a relative humidity not exceeding 55% in the conditioned spaces, when the outside dry bulb temperature is not above 95° F. or the outside wet bulb temperature above 78° F.

2. To deliver the air at 75° F. and

Distributing Head

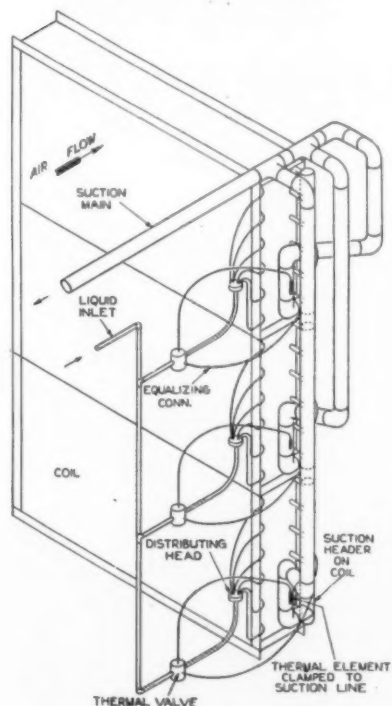
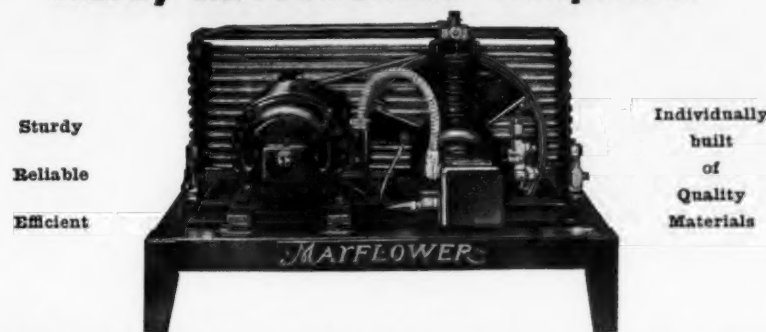


Fig. 7—Proper refrigerant proportion achieved without individual expansion valves.

To Insure Satisfaction . . .

Install a
Hardy MAYFLOWER Compressor



HARDY MANUFACTURING CO. Inc., 100 Davis Ave., Dayton, O.

Table 3—Summary of Guarantee and Actual Test Results—210-Ton Unit

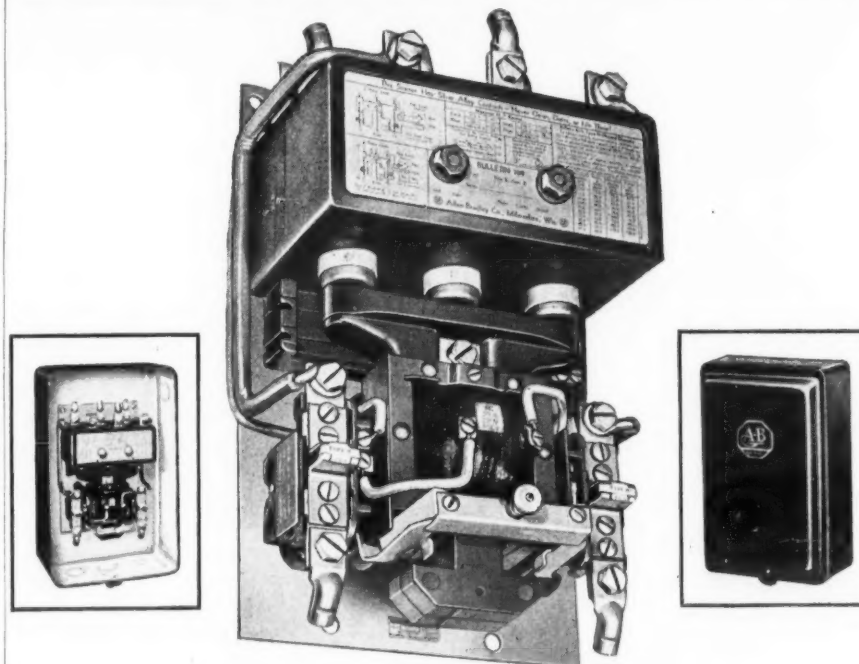
Tons (guarantee)	210	191	166	141	126	105
Tons (actual)	238.5	209	191	161	131.5	100.5
Percent capacity	100	87.7	78.8	66	55	42.2
Percent capacity (nominal)	113.5	99.5	91	76.7	62.6	47.8
Total kw. per ton (guarantee)	0.91	0.94	0.95	0.99	1.02	1.06
Total kw. per ton (actual)	0.807	0.807	0.822	0.836	0.864	0.962
Compressor kw. per ton (guarantee)	0.85	0.875	0.876	0.902	0.922	0.931
Compressor kw. per ton (actual)	0.757	0.757	0.767	0.774	0.788	0.865

the compressor and plant performance outlined above was well under the guarantee at all load conditions.

As a matter of record the contractor's engineers used a liberal factor of safety in this, their first large installation. Mention should also be made that part of the low operating power input per ton was obtained from the effective sub-cooling of the liquid in the special condensers.

This plant not only gave an initial performance gratifying alike to contractors and Government engineers, but has maintained its satisfactory record with practically no maintenance cost. The tightness of the system and the stability of Freon-12 is evidenced by the fact that no refrigerant has been added to the system since the contract performance test.

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Muffy Explains Need for and Use of Standard Rating And Testing Methods

By Glenn Muffy, Springfield, Ohio*

THIS new *Standard Method of Rating and Testing Mechanical Condensing Units* is complete in itself and I might hand it over to you without any explanation, but I would like to tell you why we needed it and how it is intended to be used. This standard has no application where compressors are sold separately from condensers and the customer buys his motor from a different manufacturer. The engineer who specifies the equipment is then responsible for performance of the entire installation. He makes the necessary calculations and corrections from standard ton conditions, selecting a motor, a compressor, and a condenser to fit the load.

When manufacturers began to build *Paper prepared for and presented at World Congress of Refrigeration at The Hague, Holland.

The Calorimeter

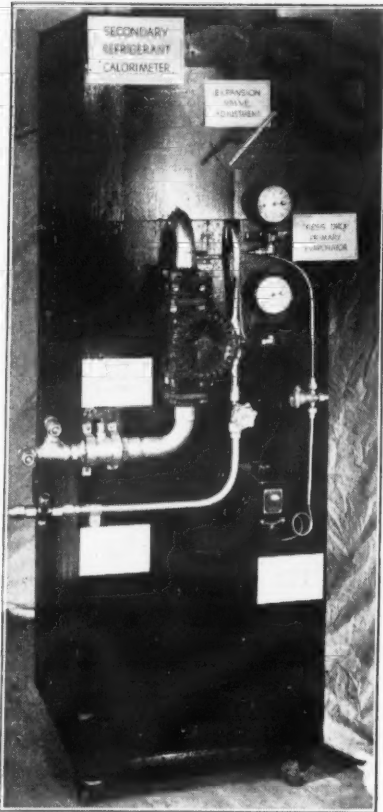


Fig. 3 shows the complete secondary refrigerant calorimeter, including control gauges, inlet and outlet connections, safety switch, etc. Electrical connections to the heaters are on the back.

small machines in large quantities, uniting the compressor, the motor and the condenser to a common base by production-line methods, these standard assemblies had to be given "overall" ratings. It was no longer possible to let the customer select his own combination of units to fit the individual job. The customer might be a small grocer or meat dealer who could not afford to hire an engineer, and who would not know how to select an engineer any more than he knows how to select the units to make up his system.

From this point on the "unit" is an assembly of smaller units and we call it a "condensing unit" because it does the whole job of condensing the refrigerant. The definition given in the first paragraph of the *Standard* reads: "A Mechanical Condensing Unit is a specific refrigerating machine combination for a given refrigerant consisting of a motor-driven compressor for operation for a given speed, a condenser, a liquid receiver and the regularly furnished accessories."

This assembled "unit" has a catalog number and a price complete, packed for shipment, usually with a charge of refrigerant in it, but always for a specified kind of refrigerant. If you change the pulley on the motor to speed up or slow down the compressor you convert it into a different "condensing unit" and the old rating does not apply. It is not the same "unit" if anything is changed.

A rating of this unit at 5° F (-15° C) and 86° F (+30° C) would be of no value to the butcher who buys it, because he is not going to operate it at these temperatures, and could not if he wanted to. He will operate it at some evaporator temperature which fits his needs, and the condensing temperature will depend upon the temperature of the condensing medium.

If it is air-cooled and must operate in a 90° F room, naturally the condensing temperature will be much higher than 86° F. If it is water-cooled the temperature depends upon the amount of water allowed to flow through it, and that in turn should be regulated to balance the cost of water against the cost of electric current to obtain something near the minimum operating cost.

Cross Section of Calorimeter

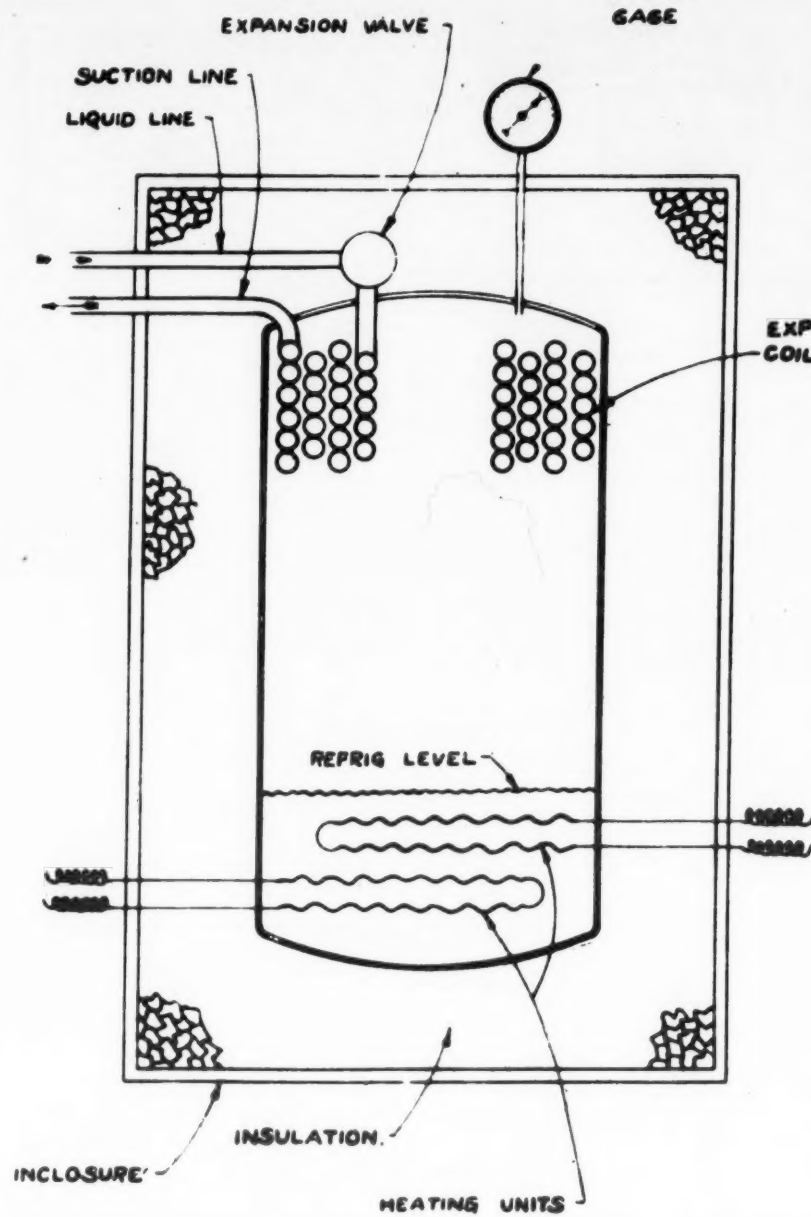


Fig. 1—Diagrammatic sketch of secondary refrigerant type calorimeter. The complete calorimeter is shown in Fig. 3. This drawing was prepared by J. L. Gibson of Frigidaire.

In practice the temperature of the suction tube usually must be high enough to avoid frosting or noticeable condensation, as the tubing is seldom insulated and often must be run through walls where insulation is impossible.

This means that the superheat of the suction gas is much more than the 9° F (-5° C) specified for "standard" conditions. The theoretical correction for change of superheat can not be used with any degree of accuracy on a unit in which the suction gas enters the crank-case of a single-acting compressor, as it does in most of these units, and is raised to a much higher temperature before it enters the cylinder.

Manufacturers have been forced to compile tables giving the capacities of each unit model for various suction pressures and condensing medium (air or water) temperatures. Each manufacturer selected what seemed to him to be a representative set of temperatures at which to run tests and give these ratings.

It also was the practice to give these ratings on a basis of running something less than 24 hours per day, as the machines are thermostatically controlled. A conservative manufacturer would figure on 12 hours running time out of the 24, while another manufacturer might rate his units on 14, 16 or 18 hours running time per day.

Each salesman would then try to select from a book full of figures some data to show how much capacity he could give the prospective buyer, all of which was very confusing to the buyer and often cost the manufacturer or dealer a considerable loss in making good an over-optimistic figure given by a salesman who might have been selling washing machines or vacuum cleaners a month before.

The "Joint Committee" which prepared this new standard was authorized by the Council of the American Society of Refrigerating Engineers, who asked the Refrigerating Machinery Association and the Refrigeration Division of the National Electrical Manufacturers Association (best known as "Nema") to join in the work by appointing three representatives each. The writer, having been active in urging that such a committee be appointed, was made General Chairman.

In its first meetings the committee agreed upon certain principles which were followed thereafter:

In general we said that here is an assembly to be rated. The manufacturer has designed certain sub-assemblies into it. He sells it as a package and it is to be rated for what it does as a whole. If it has excess condenser capacity and a motor of rather low efficiency it may equal the perfor-

mance of another assembly which includes a less efficient condenser and a more efficient motor or compressor. The user pays for so much current to get a certain amount of refrigerating effect and we will rate the assembly on this over-all performance.

If one assembly regularly includes a heat exchanger between the refrigerant lines and another does not, these are the designers' options. Each unit shall be tested with whatever parts are "regularly furnished" by the manufacturer.

This is a "Standard method," not a standard in the sense of setting any minimum efficiency that is acceptable. A buyer may compare the capacities and current inputs of competing machines under the conditions which apply to his usage. He is not interested in the separate efficiencies of various sub-assemblies such as motor, compressor or condenser unless he is planning to assemble a special condensing unit, which will then have to be tested as a whole before it can be given a rating under this Standard method.

With these principles in mind, the Committee set to work selecting typical temperatures and conditions for the ratings, agreeing late in 1934 upon the "Method of Rating Condensing Units" as given in the first column of the *Standard*. During 1935 the "Methods for Testing Mechanical Condensing Units" were evolved with the aid of two additional groups of members representing the Air Conditioner Manufacturers Association and the American Society of Heating and

Ventilating Engineers. These organizations had been invited to participate because the Committee's scope had broadened to include the rating of air conditioning equipment: they were active during the final stages of the Condensing Unit project.

As the engineers in attendance here may not recognize many of the names of the individuals comprising the "Joint Committee on Rating Commercial Refrigerating Equipment," you might like to know who they are.

In the A.S.R.E. group we have: Prof. W. R. Woolrich, a well-known author of text books on refrigeration. He is connected with the University of Tennessee at Knoxville and with the Tennessee Valley Authority during leave of absence from the university. Frank R. Zumbro, engineer for the Frick Co., Waynesboro, Pa.

Glenn Muffy, author of this paper and General Chairman of the Joint Committee, a consulting engineer in the electric refrigeration field, living in Springfield, Ohio. He was President of A.S.R.E. in 1932.

The Nema group includes: Harry M. Williams, Frigidaire division of General Motors Corp., Dayton. He is chairman of the Nema Technical Committee and is First Vice President of A.S.R.E.

Chester Lichtenberg, Secretary of the Joint Committee, is with General Electric Co. at their Fort Wayne, Indiana plant, where he is engineer in charge of design and production of all commercial refrigerating equipment.

Dr. L. A. Philipp is in charge of Research Engineering for The Kelvinator Corp., Detroit, and a frequent contributor to the technical literature of refrigeration.

The Refrigerating Machinery Association is represented by:

Louis S. Morse of York Ice Machinery Corp., York, Pa. He is President of A.S.R.E. for 1936 and has been active in designing refrigerating equipment probably for more years than any other member of the committee.

Alvin H. Baer is Vice President of the Carbondale Machine Corp., Harrison, N. J. and a Past President of A.S.R.E.

Willis H. Carrier is the founder of the Carrier Corp. and is Past President of both A.S.R.E. and A.S.H.&V.E. He is known as the Father of Air Conditioning.

The Air Conditioning Manufacturers Association is represented by:

Donald E. French of the Carrier Corp., who is particularly active on the air conditioning standardization work of the Joint Committee.

Morse and Williams are the same men mentioned above as representing R.M.A. and Nema. They are double members, representing two organizations each.

The American Society of Heating and Ventilating Engineers group consists of:

W. E. Stark of The Bryant Heater & Mfg. Co., Cleveland, Ohio, is a member of the ASHVE Council.

F. H. Faust of General Electric Co. is active in this company's air conditioning division, Bloomfield, N. J.

C. W. Walton, Jr. is Engineer in charge of air conditioning for Rockefeller Center, Inc., New York City.

Mr. Zieher of York and Mr. Gibson of Frigidaire were particularly regular in attendance and helpful on the *Standard* herein discussed.

Mr. Lichtenberg, our Secretary, and the General Electric Co. with whom he is connected deserve special mention for bringing in some of their specialists and for getting out the voluminous minutes of the many meetings in such a prompt and efficient manner.

This group has worked together in a remarkably cooperative spirit for so large a committee, including representatives of manufacturers who are keenly competitive. Several of these men are in responsible charge of engineering for companies who produce mechanical condensing units in the (Concluded on Page 39, Column 1)

Method of Wiring Calorimeter

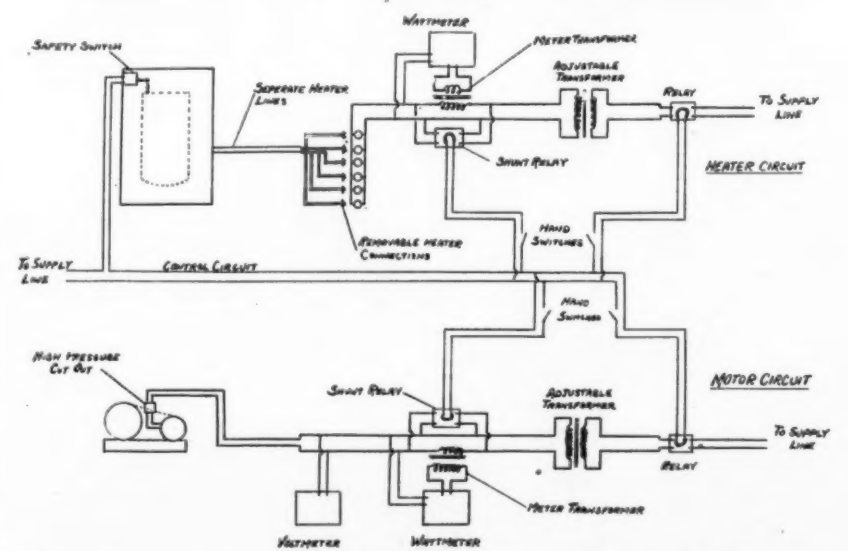


Fig. 2—Details of the wiring diagram of the secondary refrigerant type of calorimeter used by Frigidaire is shown in this figure.

in New Guinea
 "... the expedition is adopting a new technique to exploration ... AND THAT INCLUDES THE USE OF V-Meth-L

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Typical Performance Curve

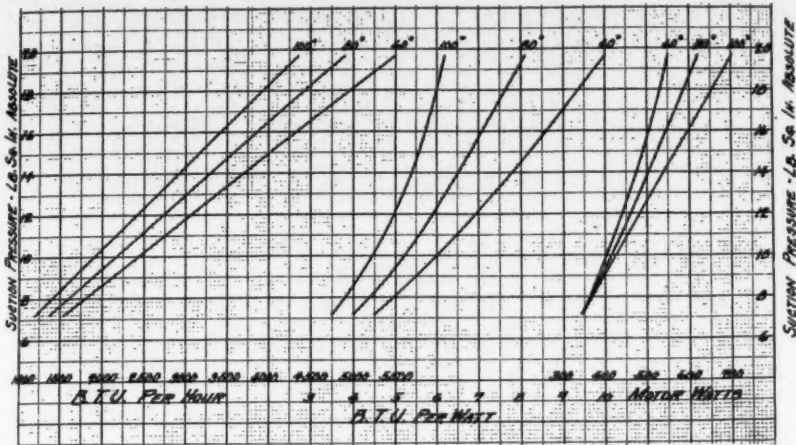


Fig. 4 shows typical curves of capacity, performance factor, and watts input for a given condensing unit tested with this or an equivalent calorimeter. The room temperatures shown are 60, 80, and 100° F., not including the 90° curve, due to the fact that this test was run before the completion of the Standard. It is the intention to continue running tests at various room (ambient) temperatures, but from now on such curves will include one at 90°.

Standards Discussed By Muffly

(Concluded from Page 38, Column 5)
largest quantities, thus insuring a workable code.

The manufacturers represented include some Nema or small machine manufacturers and some R.M.A. or old-line makers of large ammonia machines. Nema manufacturers are now making units up to 25-ton capacity and R.M.A. companies are making units down to 1/4-hp. sizes, hence both cover the field of "Commercial" condensing units. Others of the members represent educational, consulting, contracting and user groups, making a very well balanced committee.

Paragraph 1 of the Standard defines the type of machine to be rated under this code. It is a code for testing and rating a complete assembly, as defined, and should not be confused with methods for testing and rating compressors or condensers separately.

Paragraph 2 sets forth the fact that we measure power input in watts. This means all the current that goes into the motor or motors. If a separate motor is used to drive a fan to cool the condenser, its current consumption is included in this figure. We tell the buyer how much

power is required to operate the unit. He does not care whether the power is used to drive the compressor or to drive a fan. All he wants to know is:

"How much current will I have to pay for while operating this unit under the temperature conditions of my job?"

No mention is made of units which include a gas or gasoline engine for driving the compressor, but the intent is that the power input shall in that case be measured in gallons of liquid fuel or cubic feet of gas fuel.

Paragraph 3 explains what is meant by "capacity." Again it is the overall figure which is wanted. The user has a certain cooling load to handle and we tell him what the complete unit does in the amount of heat removed. He is not interested in what part of the unit deserves credit for a high efficiency or blame for a low efficiency. The unit is judged as a whole in comparison with other units.

The buyer does not purchase a compressor, a condenser, and a motor separately and mount them on his own base. He buys the complete assembly "A" or the complete assembly "B" after looking at their comparative capacities and prices and listening to the sales presentations of the two competitors.

Paragraph 4 lists the standard temperature conditions, of which there are four groups.

Group I is typical of low temperature work.

Group II is comparable with "Standard ton" conditions.

Group III represents ordinary "commercial" cooling, such as required by meat shops, hotels, restaurants, etc.

Group IV represents air-conditioning practice.

It is assumed that each manufacturer will show test data on his units at several room temperatures (if air cooled) or at several water temperatures (if water cooled), but only one room temperature is specified (90° F.) and ingoing water temperature is held at 75° F. for these four groups. The water temperature rise specified for test purposes is 10°, 15°, or 20° F. according to group. Manufacturers may show test data for colder and for warmer ingoing water with various outgoing temperatures, but they must include data on tests made at these specified temperatures in order to make their figures comparable with those published by other manufacturers.

Water-cooled units are to be tested in a 90° F. room temperature (ambient temperature) the same as air-cooled units. This is because water-cooled units are more or less cooled by air, particularly when the compressor is not water-jacketed or when the refrigerant is condensed in an exposed or partially exposed shell.

A given unit need not be tested at all four of the suction pressures, but it must be tested at the ones given

Cooling Coil

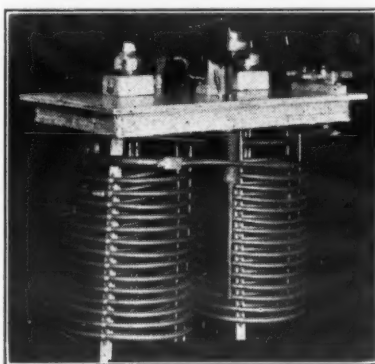


Fig. 8 demonstrates one of the cooling coils and heater assemblies of the same G-E calorimeter. These assemblies are of unit construction, all of one size as to dimensions of the insulated base, so that they are interchangeable among the different brine tank calorimeters. The assemblies are connected in parallel, the number used depending upon the size of the calorimeter. The expansion coils are immersed in a suitable brine solution.

The desired superheat is maintained by controlling the brine temperature. Each cooling coil and heater assembly is provided with two immersion type electric heaters of the three-heat-unit type with three-heat switches. Approximate control of the brine temperature is maintained with these three-heat switches. In each brine tank the input to one unit of one heater is controlled by means of a rheostat for the more exact control of heat input.

The desired refrigerant temperature is maintained with the expansion valves.

Suction vapor and liquid temperatures are determined with mercury thermometers in thermometer wells.

Brine Tank Calorimeter

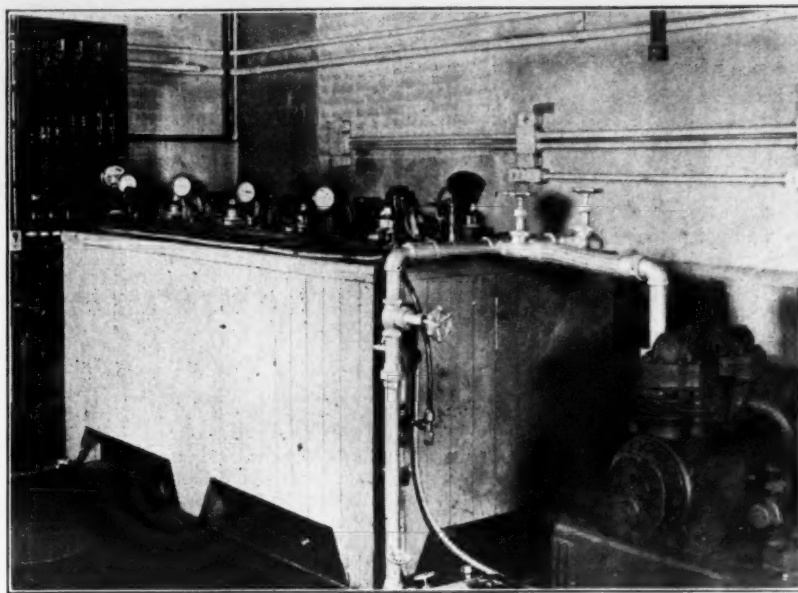


Fig. 9 shows a brine tank calorimeter used by the General Electric Co. at their Fort Wayne plant for making primary tests. The capacity is 120,000 B.t.u. per hour.

Mixing Apparatus

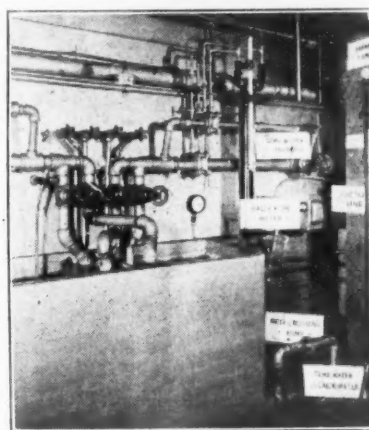


Fig. 7 is another view of the concentric tube type of calorimeter, showing more details of the apparatus for mixing and controlling the flow of water.

and tons are 2,000 lbs. melting ice effect or 288,000 B.t.u.'s.

A few typical laboratory set-ups for running tests in accordance with this Standard are shown in the illustrations.

Concentric Tube Calorimeter

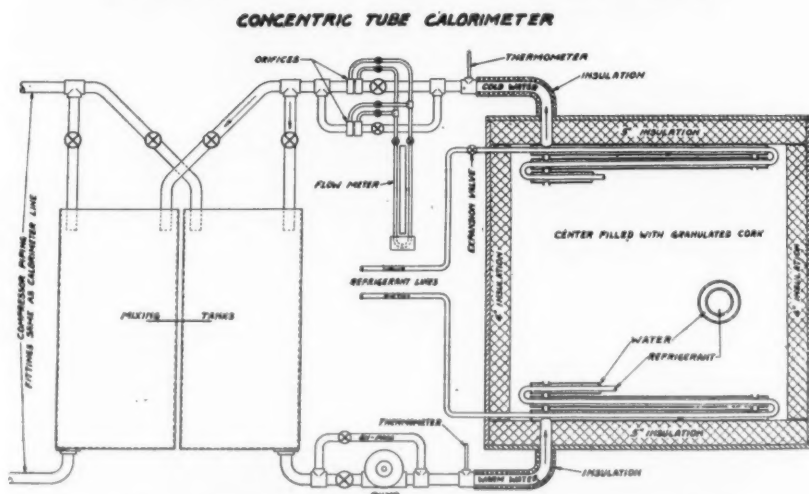


Fig. 5 is a diagram of the concentric tube type of calorimeter.

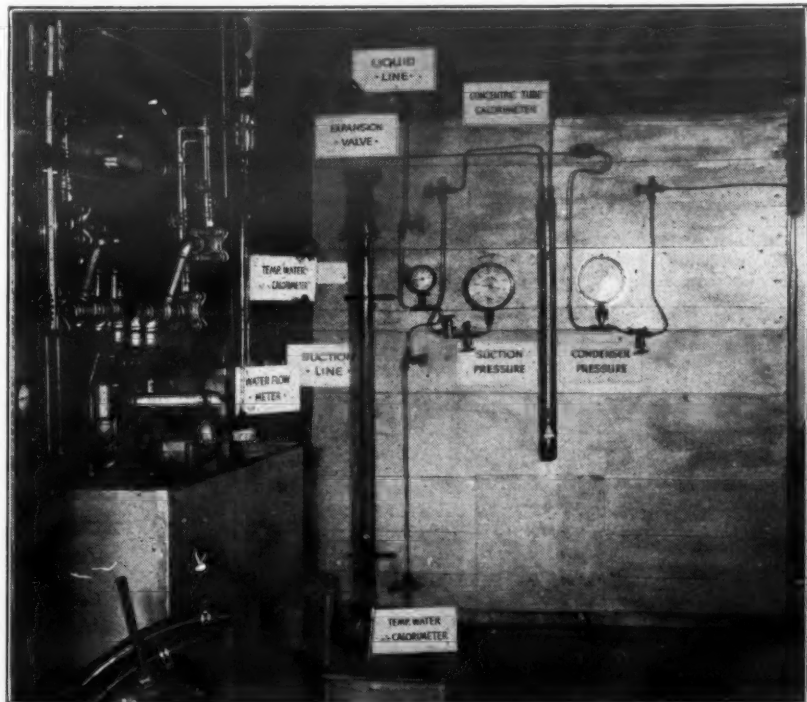
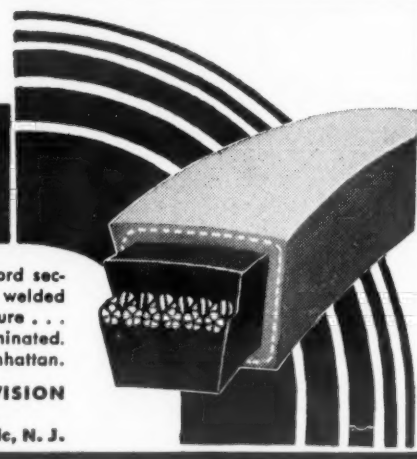


Fig. 6 is the complete concentric tube calorimeter comprising the calorimeter proper, control gauges, thermometers, and apparatus necessary to control the flow of water to both the compressor and calorimeter.

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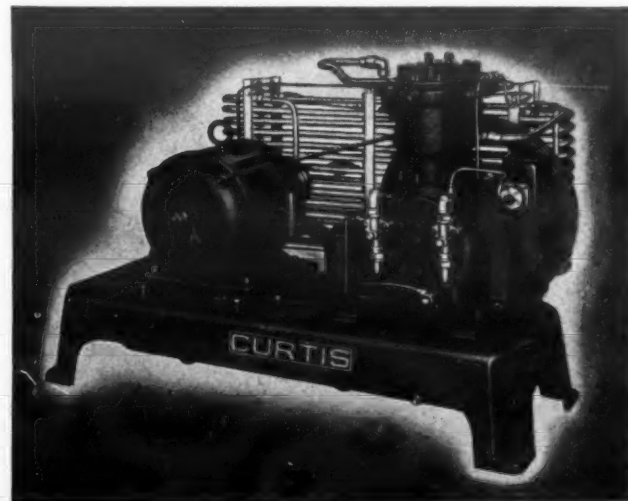
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Air Conditioning

Air Conditioning Had Beginning In Industrial Needs, but Soon Spread to Comfort Functions

By William B. Henderson,* Executive Vice President
Air Conditioning Manufacturers Association, Washington, D. C.

THE early beginnings of the air-conditioning industry in the United States, like those of so many other important industrial movements, have become shrouded in the haze of passing years. But it is definitely established that at the turn of the 20th century several industrial air-conditioning installations were in operation.

Air conditioning was the natural outgrowth of the activities of two other industries, refrigeration and heating, and Willis H. Carrier was prominent among those who were responsible for much of the early research and experimental work which resulted in welding the elements of refrigeration and heating into the fundamentals of air conditioning as it is known today. The origin of the term "air conditioning" is somewhat more definite. One of the pioneers, Stuart W. Cramer, wrote in 1904:

*Paper presented at Seventh International Congress of Refrigeration held in Holland, June 16 to 20, 1936, by George F. Taubeneck.

"When entering this field, several years ago, I was puzzled to find a word that would embrace this whole subject: in casting about, I finally hit upon the compound word, 'Air Conditioning' which seems to have been a happy enough choice to have been generally adopted. The idea was suggested by the use of the term 'Conditioning' in the treatment of yarn and cloth, and even of raw materials before manufacture."

Industrial Air Conditioning First

The use of air conditioning in connection with industrial processing was the first experimental stage in the development of the air-conditioning industry. Probably the greatest strides were made in its use in textile processing, where control of humidity, temperatures, and air cleanliness has contributed substantially to the growth of the textile industry.

Air conditioning permits the production of more uniform qualities, in large and sustained volume at lower costs. No longer do seasonal climatic

changes affect the textile industry with enforced irregular production. The printing and allied industries were also prominent among the early users of air conditioning, for materials used in those industries reacted to temperature and humidity changes in such a manner as to present serious production problems.

It is said that one of the first successful attempts to control air conditions in an enclosed space occurred in 1902 as a result of the desire of a Brooklyn printer to solve the problem of quality and production loss resulting from weather variations within his plant. Today, American industry makes regular and wide use of air conditioning in the treatment of raw materials and in the processing of merchandise.

Several hundred widely diversified industries, running the gamut from heavy steel to cosmetics and candy, command at will the weather most ideally suited to the production of their particular goods. Thus air conditioning has become an integral part of the warp and woof of America's industrial fabric.

But users of industrial air conditioning soon found that the artificial weather conditions maintained in their plants had a generally beneficial effect on the health, comfort, and efficiency of their employees. With this realization and the accumulated experience of the effect of air conditioning on industrial workers, it was but a step to apply the same principles in controlling atmospheric conditions in places of public assembly.

Thus the door opened to disclose the almost unlimited field lying before this new industry.

Human Comfort Air Conditioning

Theaters and auditoriums were among the first fields of experiment in the use of air conditioning for mass human comfort. More than fifteen

years ago the first American theater installed air conditioning equipment and today many thousand air-conditioned theaters throughout the country secure substantially increased patronage through offering relief from uncomfortable outside temperature, in addition to entertainment.

American railroads for several years have relied on air-conditioned railway cars to stimulate passenger traffic. At the close of 1935, 5819 railroad and Pullman cars were air-conditioned by means of various types of equipment, and it is reported that plans are being made to air condition an additional 2500 Pullman cars and 6500 railroad-owned cars during the next few years. Taking their lead from the railroad, ships, airplanes, and even motor busses, are now being air conditioned.

Now Everyday Necessity

Air conditioning in the United States has passed the point of popular acclaim by the public as an attractive innovation. It is now a commonplace, everyday necessity which the public demands as a regular service of those who would sell the public their wares. American business men have been quick to realize that the lack of air conditioning in business establishments serving the public is a distinct competitive handicap.

Thus we have seen an amazingly rapid growth in the use of air conditioning by department stores, hotels, specialty shops, restaurants, beauty parlors, mortuaries, and similar places. A remarkable feature of this growth in the public demand for air-conditioned comfort is that it has been cumulative in its intensity during the past five years, when the country was suffering from the effects of the worst economic depression in its history.

But great though this growth has been, the market for air conditioning has scarcely been tapped. To illustrate: The city of Chicago is one of the leading centers in the number of air-conditioning installations per capita in the country. At the close of 1935, while fifty per cent of Chicago's theaters were air conditioned, only approximately four per cent (143) of its restaurants were offering their customers controlled weather, despite the fact that restaurants, as a group, had doubled and tripled their purchases of air conditioning equipment each year during the previous several years.

Though restaurants, with that very small percentage of saturation, are in second place in the list of users of air conditioning in Chicago, a survey of other types of service establishments in Chicago revealed that these other markets for air conditioning were only a small fraction of one per cent saturated! At the close of 1935, Chicago's 934 reported air-conditioning installations were divided among many types of users, as shown in the following table:

Table 1—Air-Conditioning Installations in Chicago at the Close of 1935

Banks	8
Brokers and exchanges	9
Beauty shops	12
Churches	4
Civic buildings	1
Clubs	4
Dance halls	4
Doctors and dentists	15
Drug companies	21
Hospitals	14
Hotels	24
Industrial	19
Bakery	29
Candy	24
Printing	24
Miscellaneous	28
General offices and buildings	83
Private offices	171
Residences	69
Restaurants	143
Stores	16
Clothing, Department	28
Fur	8
Shoe	15
Food	7
Miscellaneous	16
Studios	5
Undertakers	21
Theaters	131
TOTAL	934

The same percentages and degree of distribution are generally applicable to other American cities, and, with the Chicago situation as a yardstick, one can secure some realization of the vast market there is awaiting the products of the air-conditioning industry.

But the greatest potential market for air conditioning is in the residence and office building field. This is almost virgin territory and awaits only the spark of promotion and the application of some of the fundamentals of mass production and mass selling which have been prominent in the development of the automotive and mechanical refrigerator industries.

The problems to be met are not insurmountable. They will be solved, and are being solved, by human ingenuity working painstakingly in the research laboratories and plants of the manufacturers of air conditioning equipment.

Education Necessary

Among the problems requiring solution by the air-conditioning industry of the United States at the present time is the education of the general public as to what air conditioning is and what it can do in the promotion of physical well-being. It is not surprising that the rapid growth of air conditioning has resulted in some confusion in the public mind.

This lack of knowledge has opened the way for some suppliers of fans, blowers, humidifiers, deodorizers, and other units of air-handling equipment, to offer such equipment units to buyers as "air conditioners." As a matter of justice, however, it should be noted that such suppliers themselves are often under a misconception as to what constitutes "true" air conditioning.

But with more general public understanding of what air conditioning is, this situation will right itself. The Federal Trade Commission of the United States Government and the National Better Business Bureau are helpful agencies in correcting such misunderstandings. The latter body, after conference with various technical and trade authorities, has widely publicized, for the guidance of advertisers and publishers, the minimum functions required of an "air conditioner." These are stated in the Bureau's Bulletin as follows:

Types of Conditioning

Summer Air Conditioning should, as a minimum, (1) cool the air, (2) dehumidify the air, (3) circulate the air.

Winter Air Conditioning should, as a minimum, (1) heat the air, (2) humidify the air, (3) circulate the air.

Year-Round Conditioning should, as a minimum, (1) cool and dehumidify the air in summer, (2) heat and humidify the air in winter, (3) circulate the air.

But in addition to the public requiring education as to what air conditioning is, it is also necessary to educate the public as to what air conditioning can do.

(Concluded on Page 45, Column 3)

ADD UP THE FACTORS THAT HELP YOU SELL REFRIGERATORS

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2. Customer good will
3. Courteous service
4. Fair prices for high quality

ADD THESE UP, AND THEN ADD ONE MORE: the additional acceptance that General Electric motors will give your product. These five factors mean SALES AT A PROFIT!

Your prospects know refrigerators by reputation, and associate high quality and good service with names well known in the appliance industry. In a similar manner they associate General Electric with the best electric equipment, for General Electric has been making fine motors for appliances as long as there has been an appliance industry.

Hence it's like adding 2 and 2—good refrigerators plus good motors, and the recognized reputation of the refrigerator manufacturer plus the recognized reputation of General Electric. They make an unbeatable sales combination in any business. General Electric, Dept. 6A-201, Schenectady, New York.

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General Electric was included by 8200 of the 10,000 who answered. It was first choice with 5300, as compared with 1950 for the manufacturer that ranked second.

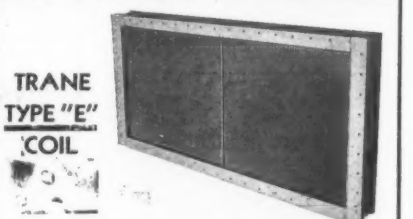
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COMMERCIAL Service Manual

By K. M. NEWCUM

Crankshaft, Eccentric, Connecting Rod Assemblies Used on Commercial Units

CHAPTER 6—Commercial Condensing Units—Continued

Crankshaft and Connecting Rod Assembly

The crankshaft used in commercial compressors is similar in appearance and construction to the automobile crankshaft. It is made of forged steel or alloy steel and ground to precision limits to provide proper tolerances for the main and connecting surfaces.

The shaft is perfectly balanced to reduce vibration to a minimum. Fig. 33 illustrates a typical double crank and single crankshaft. Note the single crankshaft is counter-balanced, while the double crankshaft is not counter-balanced. It is not uncommon, however, to counter-balance the double crankshaft as shown in Fig. 36.

Fig. 37 shows the York crankshaft and connecting rod assembly. Note the highly polished bearing surfaces.

Connecting rods in a refrigeration compressor are not unlike the auto-

mobile engine connecting rod. They are of forged steel or alloy steel, rigidly tested and inspected for true-ness and alignment. The majority of connecting rods are of the H beam type to assure rigidity. The connecting rod bearing surfaces are usually of the automotive type, or babbitt spun into the connecting rod and bearing cap by one of several special processes. Some compressor manufacturers use special bronze for connecting rod bearing surfaces.

Due to improved machining and gauging processes, the bearing surfaces are machined to a perfect fit and do not require running-in such as was common practice a few years ago in the automotive industry.

The bearing surfaces are scored to permit proper oil distribution to the entire bearing surfaces. The bearings are usually fit to a snug slip fit, which means that the bearing is tight but does not bind on the bearing surface.

In refitting connecting rods, it should be kept in mind that a tight bearing will cause a drag on the motor, with resulting excessive current consumption as well as unnecessary heating of the compressor.

Due to the relatively slow speed and low temperature operation of a refrigeration compressor, and to the accuracy of machining operations, wear at the bearings is very slight. If the proper oil level is maintained so that the required amount of lubrication is supplied to the bearings, many years quiet operation should result.

Crankshafts are case hardened and in most compressor designs the shaft seal nose rides against a shoulder on the crank shaft. The crankcase is provided with oil passages to provide adequate lubrication to this point of friction. The supply of lubricant is automatic so long as the proper level is maintained.

Eccentric Shaft and Connecting Rod Assembly

The eccentric shaft differs from the crank shaft, namely, in that the crank or cranks are not forged onto the shaft. The eccentric shaft is straight (see Fig. 34 which shows a runner double and single shaft.)

The main bearing surfaces like the crankshaft are machined to highly polished surfaces and are held to close tolerances.

The eccentric—see Fig. 34—is fitted onto the shaft and drawn up against a shoulder at the seal end of the shaft by means of a nut threaded onto the thrust-bearing end of the shaft.

Some makes have the eccentric shaft scored to take one or more woodruff keys. With this design the eccentric is also scored to fit snugly over the woodruff keys. The keys act as a locking device after the eccentrics have been pressed onto the shaft. This assembly is then secured by a set screw and lock nut. Such an arrangement is shown in the Frigidaire compressor shown in Fig. 38.

Some designs depend entirely upon the set screw and lock nut principle of securing the eccentric to the shaft.

Other designs employ the clamp principle.

Absopure compressors employing the eccentric have the shaft threaded with a left hand thread on the thrust end of the compressor. A corresponding thread is provided in the eccentric. When assembled and tightened, no locking device is required as the rotation is correct. To reverse the rotation of the compressor would tend to loosen or unscrew the eccentric. The correct direction of rotation is counter-clockwise facing the commutator end of the motor. This design is shown in Fig. 39.

The single eccentric usually employs a counter-balance, while the double eccentric tends to act in itself as a counter-balance.

The eccentric is usually made of cast iron, and the connecting rod bearing surfaces are machined to a smooth highly polished finish with tolerances held to close limits. The connecting rod is also cast iron in most compressors, although some manufacturers use bronze.

Fit between the eccentric and the rod bearing is termed a "free fit" as there is an unusually large bearing surface. The connecting rod is free to move sideways on the eccentric as the piston bosses align the rod.

There is a right and wrong way to install the connecting rod on the eccentric in most compressors. Care should be used when disassembling the eccentric type compressor and a note should be made of the correct relation between rod and eccentric.

The eccentric and rod may be expected to give many years of quiet service without any appreciable wear, providing the proper oil level is maintained in the crankcase.

One common cause of premature knocks in eccentric type compressors is from the eccentric working loose from the shaft and rattling or knocking. This condition may be determined by removing the belt and pulling the flywheel back and forth. Any appreciable looseness will both be felt and heard.

Often however knocks of the same type may be traceable to the flywheel being loose on the shaft and/or the flywheel proper being loose at the hub. This latter condition is applicable only to the pressed steel flywheel which is riveted to the hub.

Like the crankshaft, the eccentric shaft is case hardened and in most designs has a shoulder against which the seal nose rides.

Due to the fact that the eccentric type connecting rod is free to move sideways on the eccentric it is possible that it may not be correctly aligned or centered when installing the cylinder on a separable type compressor, and by forcing the cylinder down into the place the rod may be sprung. To prevent this, the shaft should be turned slowly while drawing the cylinder down into place.

Frigidaire 2-Cylinder Compressor

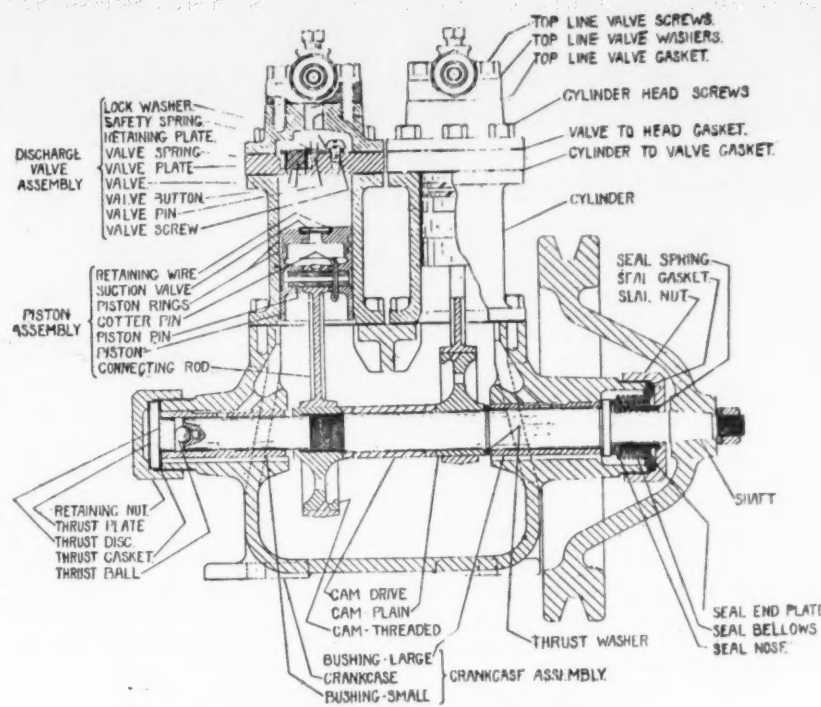


Fig. 38 shows the method used by Frigidaire to lock the eccentric onto the shaft.

Absopure Design

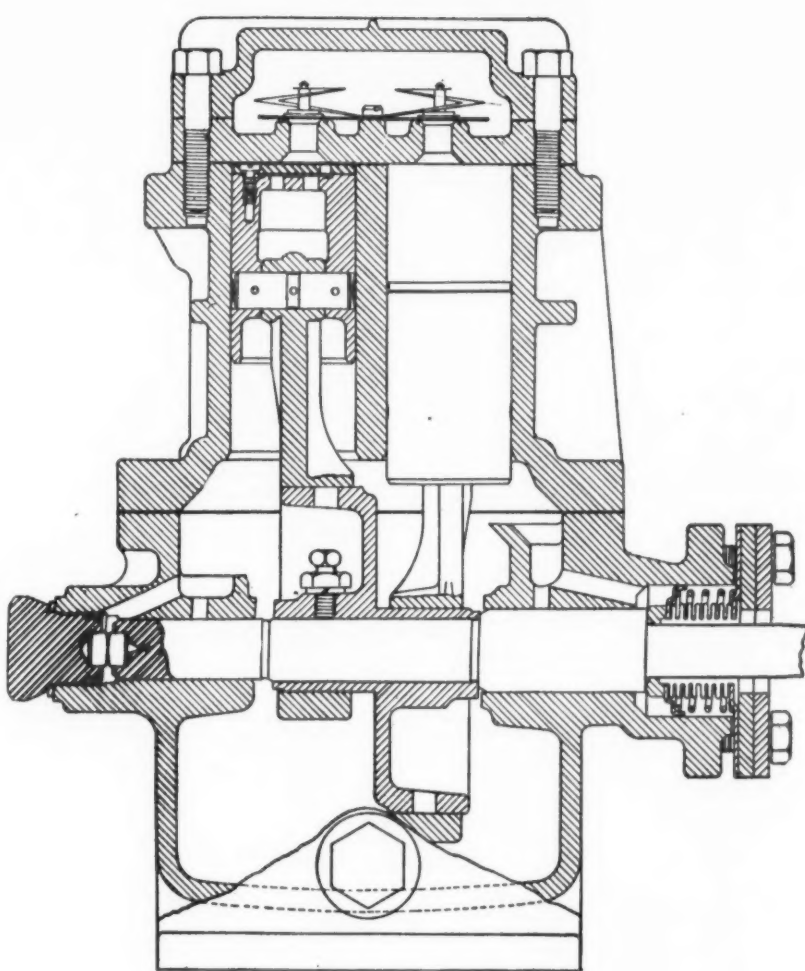


Fig. 39 demonstrates Absopure's system of screwing the eccentric on the driving shaft.

Curtis Compressor

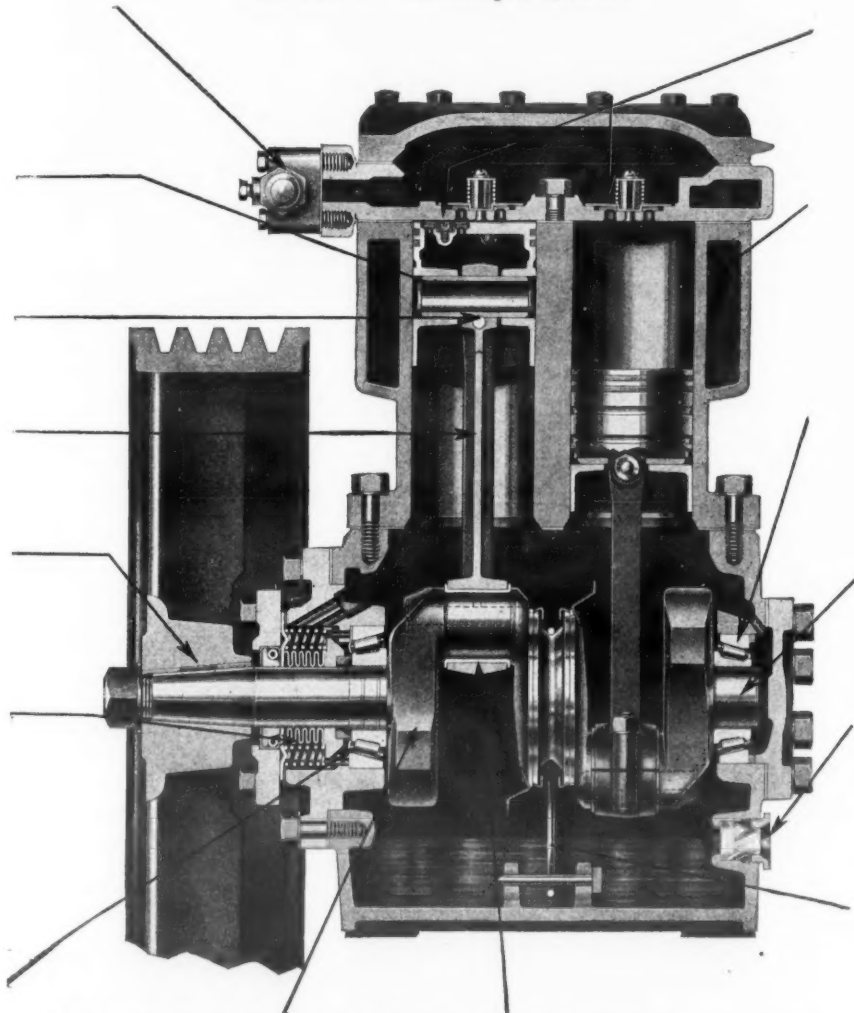


Fig. 36—Cross section of Curtis compressor showing method of oiling and counter balancing of double crankshaft.

York Crankshaft Assembly

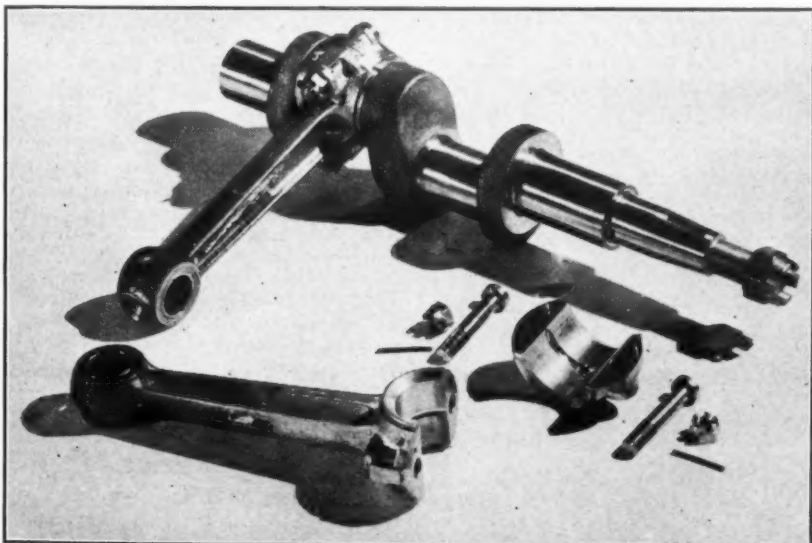


Fig. 37 shows the crankshaft and connecting rod assembly used in York commercial condensing units.

Refrigeration and Air Conditioning Supplies



Twelve years ago we established a department to handle refrigeration material for Export. In 1932 we entered the domestic market. Since then we have opened the following branches where we stock for immediate delivery everything of interest to the Refrigeration Trade.

Melchior, Armstrong, Dessau, Co., Inc.

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Harrisburg, Pa.

1104 Bedford Ave.
Brooklyn, N. Y.

Commercial Uses

Refrigeration Engineers Tell of Research in Commercial Field at Congress

Summaries of papers presented at the World Refrigeration Congress at The Hague. Other summaries were presented in August issues of the News.

Cold Storage in its Applications to Furs And Fabrics

By C. A. Aspinwall
United States

The use of cold air to protect furs and fabrics from moths was originated in 1895 by the Security Storage Co. of Washington. At that time there was no knowledge about the degree of cold which would kill the moth larvae or prevent the eggs from hatching, although it was known that the clothes moth was inactive in winter temperatures. Experiments were carried on for a number of years by Dr. Albert M. Read, president of the company, and officials of the Bureau of Entomology of the United States Department of Agriculture.

Later experiments developed that larvae of the webbing clothes moth and of the black carpet beetle could withstand, for a considerable time, a temperature of 18° F. It was then discovered that it is not cold but a sudden change from cold to warm temperature and back to cold again that most quickly results fatally. For moth treatment, articles are refrigerated at 18° F. for several days, then suddenly exposed to 50° F., then returned to 18° F., and finally held permanently at about 40° F.

This small beginning in 1895 initiated a practice that has grown to

larger proportions and led to the investment of many millions of dollars in cold storage equipment for the care of furs. The invasion of this field by warehousemen was actively opposed by many furriers who had had a monopoly of this business. Finding their customers attracted by this new method, many of them advised their customers that cold storage was damp and would rot and would otherwise injure the furs. Of course, the facts are that the air in cold storage vaults is much drier than the outside air.

This opposition took many years to overcome but gradually the furriers saw the light and realized that they could make use of cold storage to advantage, so that now, in all the large centers, practically all the furriers use cold storage. In addition to protection from heat and insect damage, cold storage also preserves the vitality and lustre of furs.

Brewery Plant Practices Modernized

By F. P. Siebel, Siebel Institute of Technology, Chicago

An explanation is given of new type building construction of inexpensive light-weight re-enforced concrete stronger than any type of construction ever presented in the past for an equal amount of material, cost and heavy weight. Standard insulating methods are applied to these walls

in a way that assures the stability of the insulation throughout the life of plant.

Considerable discussion is given on new designs of refrigerating equipment, especially the possibilities presented by the centrifugal compression unit together with its features of economy of operation and ability to float with the load. Where steam driven equipment is desired, the possibilities of the high speed turbine for the pumps, compressors and generators are given.

The importance of air conditioning the cellars, including proper control of air purity, dilution of CO₂ gases, air circulation, temperature and humidity control are explained in detail, not only for the fermentation room but for the Baudelot cooler rooms, stock cellars, racking room, hop storage, yeast storage and, in fact, all the necessary cellar requirements in the stock house of the modern brewing plant. Definite requirements as to correct temperatures and humidities necessary for the various cellars are released. This data has been taken from experience of the author based on original design and proven by over a period of three years of actual operation in the brewery industry and by further experience in associate industries over a period of ten years.

Control of Multiple Effect Separators

By H. Inokuty and Z. Nagaoka
Institute of Physical and Chemical Research, Tokyo

This new control method is a device of maintaining automatically the pressure in the separator of the multiple-effect refrigerating machine at its maximum efficiency. In this method, the temperature difference of the saturated refrigerant in the separator and the multiple-effect injection gas separated therefrom and drawn to the compressor, is adjusted to be constant by means of increasing or decreasing the opening of the multiple effect expansion valve in accordance with the variation of the temperature difference.

The majority of automatic multiple-effect separators hitherto introduced having been fitted with a float, the

operation has been liable to be checked by the rolling of ships. In this control method, floats or the like are not employed, but the fact is utilized that the superheated temperature of the multiple-effect injection gas decreases when the separator pressure is too high, and increases when it is too low.

When the multiple-effect separation gas is heated by means of exchanging heat between the injection gas and high temperature liquefied CO₂, the injection gas is superheated to a suitable degree if the separator pressure is suitable, as it is a complete dry gas, but if the separator pressure is too high, the quantity of gas separated from the separator is less than that of the gas drawn into the compressor, and consequently the liquid CO₂ is mixed with the multiple-effect injection gas and is drawn to the compressor. Therefore, the liquid CO₂ evaporates, and notwithstanding the heat exchange, the injection gas is not superheated or only slightly superheated. Contrarily, if the separator pressure is too low, the gas quantity drawn to the compressor is small, and the multiple-effect gas is considerably superheated.

Consequently, by opening the multiple-effect control valve when excessively superheated and closing it when superheated too low, and thus by holding a suitable superheating degree, the separator pressure is suitably maintained.

This control method has been experimented, and its actualization is fully convinced.

Low Pressure Control with Ammonia

By Tomo-O Note

Central Research Station, South Manchuria Railway Co., Dairen

By applying the so-called two stage ammonia vacuum refrigeration system, which comprises a booster compressor and a high pressure compressor, with ammonia as the refrigerant, the author has succeeded in keeping a chamber, provided with wall insulations of ample thickness, at such extremely low temperatures as -60° to -70° C. for a long testing period continuously. The size of the chamber is 14 m² (= 3.5 m x 4 m) in floor area and 4.2 m in height.

When the chamber is kept at such low temperatures, the ammonia in the evaporating coils usually is at a temperature below the triple point and hence the oil is filled up with solid ammonia.

In order to actually realize this state, it is necessary to charge intermittently the evaporating coils with liquid ammonia cooled as near down to the triple point as possible, unless the heat transfer surface of the evaporating coils is ample enough to avoid the necessity of evaporating temperatures below the triple point. Furthermore, precautions have to be taken for protecting the liquid lines, and especially the regulation valves, from becoming clogged with solid ammonia due to the occurrence of local supercooling.

It is clearly revealed that when the chamber is operated at temperatures lower than -50° C., defrosting devices of the evaporating coils can be dispensed with.

For the evaporation of ammonia at extremely low pressures corresponding to such low temperatures, a special precaution is called for in properly limiting its static head in the coils so as to make its evaporation more effective.

The equipment of the refrigeration plant described includes electrical devices and apparatus for the automatic operation of the compressors and the automatic temperature control.

Cold Accumulation With Brine

By Y. Cabane

Etablissements Daubron, Paris

One litre of brine can absorb approximately 0.85 kcal. per degree C. temperature rise, whereas one kilogram of brine ice on melting absorbs 80 kcal. at nearly constant temperature. Hence the superiority of frozen liquids as a means for storing up refrigeration. The report deals with cold accumulators in which the ice is formed by means of direct expansion finned pipes.

The described process (French patent No. 343,358) consists in: 1. congealing the solution on direct expansion continuous freezers, from which scrapers clear off the ice crystals which float then in the solution; 2. pumping the solution containing the suspended ice crystals into radiator-accumulators placed in the space to be cooled; 3. holding back the ice crystals in these accumulator tanks by a filter-sieve, so that the unfrozen part of the solution only is allowed to return to the freezer.

This process has the following advantages: 1) the ice is produced under high yield conditions; 2) the ice crystals can be accumulated in

tanks of any shape (double walled); 3) it is possible to stock up refrigeration in any intermediary tank whatsoever, independent from the apparatus where the cold is to be used; 4) it is particularly suited for the accumulation of cold in transportable isothermal boxes, such as refrigerated cars or trucks, eliminating handling labor, using waste spaces not suitable for loading foodstuffs, increasing the space left free for the latter and, when necessary, allowing the temperature to be lowered by several degrees in the insulated space.

Refrigeration Instruction In France

By Ed. Sauvage, France

Training in refrigeration matters, comprising the study of the means of production, the effect of cold on organic matters, the preparation, storage and transportation of foodstuffs, as well as numerous other applications, notably in the brew and dairy produce industries, in France is given at a well-organized school. Accessory lectures on refrigeration are delivered in various establishments.

The school, called the "Ecole supérieure du Froid industriel," was founded by the French Association of Refrigeration in 1910. It is at present installed at Paris on the premises of the Public Works, Building, Trade, and Industry School, and possesses well equipped laboratories at Cachan, near Paris, on a site owned by this school.

The syllabus is divided into higher instruction, secondary training, and preparatory courses for the higher instruction.

Special training is also given in various establishments: at Paris, at the Conservatoire des Arts et Métiers, at the Ecole centrale des Arts et Manufactures and at the Institut national Agronomique; at Le Havre, at the Ecole pratique de l'Industrie; and lastly, at the Ecoles d'Agriculture at Grignon, Rennes and Montpellier.

Courses for Refrigerating Plant Operators at Le Havre

By L. Vauclin, France

The author, Director of the Courses, gives a historical survey of the instruction for refrigerating plant mechanics, created at Le Havre in 1920 by the French Association of Refrigeration with a view to preparing operating men capable of taking care of the proper running and maintenance of a complete refrigerating plant.

This instruction comprises two parts: one, theoretical, of 25 one-hour lectures, the other, practical, of 8 two-hour sittings with visits to local refrigeration factories and breweries, as well as to the engine rooms of refrigerated ships whose home port is Le Havre.

The lectures are delivered at the Ecole pratique d'Industrie at Le Havre, equally School for Naval Engineers, and are generally attended by:

- (1) pupils preparing for the Engineer-Officer qualification;
- (2) pupils from the Ecole pratique d'Industrie, Le Havre;
- (3) pupils from the Colonial School, Le Havre;
- (4) workmen and foremen from the petroleum refineries, steamship companies, large local industries, postal staff, etc. . . all these pupils already possessing of a certain amount of theoretical and practical experience.

Since its formation, the Le Havre Course has passed out 300 pupils, 103 of whom have obtained the Refrigerating Mechanical Operator certificate delivered by the French Association of Refrigeration.

The report gives the program of the theoretical course and the practical work and supplies full details of their organization.

Heat Recuperation of Solid Carbon Dioxide

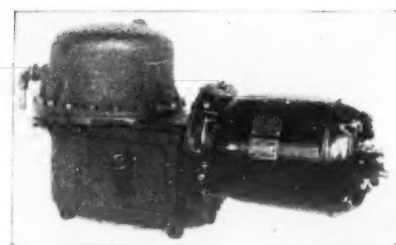
By G. Maiuri, England

The author's dry ice production system, as described in various publications, consists of single stage compression of the CO₂ gas to a moderate pressure under which it is liquefied and stored in a tank. The cold liquid may be frozen in the form of snow or solidified totally or partially in blocs obtained by external extraction of heat. It is also possible to directly introduce the low pressure gas in

(Continued on Page 43, Column 1)

Wagner Electric Pioneered in Refrigerator Motor Design

Constant Improvement by Wagner Has Resulted in Motors That Are Second-To-None for Refrigeration



The first refrigeration unit equipped with Wagner motor—built in February, 1919.

In February, 1919 Wagner built, designed and applied its first motor to a household refrigeration unit—(See above photo)—a 1/4-hp repulsion-start-induction motor. The motor used on this refrigeration unit was an adaptation of the standard Wagner repulsion-start-induction brush-lifting motor.

As the electric refrigeration industry progressed, this type of motor soon became practically the only type of motor used on electric refrigerators because of many desirable features, such as:

1. The repulsion-induction principle of motor design provided the necessary starting torque to overcome the high inertia in starting refrigerant compressors.
2. The brush-lifting feature of the repulsion-start-induction motors allowed so many economies in design that non-brush-lifting repulsion-induction motors could not compete very favorably. (Note: Capacitor motors were not commercially developed at that time.) Also, the brush-lifting repulsion-start-induction motors were much quieter and did not interfere with radio reception during their operating periods—an important consideration because of the parallel development of radio.
3. The sturdy and extra strong construction of frame, endplates, rotor and stator made the motor readily adaptable, for it could withstand the continuous and rough treatment early refrigerators received.

With the further progress of the electric refrigeration industry, Wagner, as a motor manufacturer, had to meet many new demands and problems. That these problems were satisfactorily solved is attested

by the reliability, economy, and satisfactory performance of refrigeration motors of today. The three most important considerations that Wagner had to face were: (1) starting reliability, (2) oiling, and (3) noise. A brief history of each problem and how Wagner overcame them is interesting.

STARTING RELIABILITY. The fractional-horsepower motors of the War and pre-War days were not usually applied to appliances and machinery that operated intermittently. Hence, the design of these old motors merely provided sufficient starting characteristics to insure that the motor would get up to full speed. Further, the construction of the starting mechanism was very simple and of sufficient reliability to outlast the normal life of the motor.

Wagner, by improving the design of the brushes, brush holders, commutator bars and segments, brush-lifting mechanism, etc., was able to considerably better the starting operation of the motor, including a large factor of safety in the life of the switching mechanism.

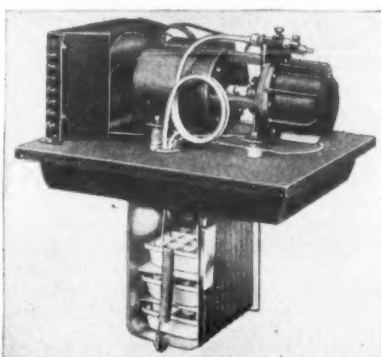
OILING. The Wagner motor applied on the refrigeration unit shown at the left was lubricated by the wool-pack method. This type of oiling worked all right for most applications where motors were properly oiled periodically. However, the average householder would neglect this important maintenance function, with the result that there were many failures. Wagner redesigned the lubrication system to a system with oil rings to lubricate the bearings and oil wells of sufficient size to hold a plentiful supply of oil. This proved to be inadequate, for in transit, there was much spilling of oil.

Finally, Wagner developed the wool-yarn lubrication system that is used today. A system that provides the bearings with sufficient lubricant so that only occasional oiling is necessary, and at the same time eliminating oil spilling.

NOISE. Since 1913, Wagner has built a special quiet line of large repulsion-start induction motors for the blower and compressor industries. Hence, fifteen years ago, when the problem of noise first confronted the refrigeration industry, Wagner was well qualified to develop and produce quiet motors for refrigerator drives. Working closely, at all times, with the members of the refrigeration industry, Wagner in

the early stages developed quiet motors that satisfactorily met public approval.

Some of the means and methods used by Wagner in the design of quiet-running motors are: (1) dynamic balancing of the rotors; (2) refinements in the electrical design and construction, such as skewing the slots, altering the air-gap, improving the slot dimensions and proportions, improving winding construction, etc.; (3) using resilient mountings; (4) eliminating end-play noise by using resilient thrust washers; (5) cushioning the switch parts with shock-absorbing material; (6) by accurately diamond-boring the bearings to insure correct clearances and alignment; and (7) selection of the proper brushes for torque and quietness during starting and stopping.



A modern refrigeration unit of today—equipped with Wagner motor.

Wagner realizes that the progress of the electric refrigeration industry has been immeasurably tied up with its progress. As the industry moves on, and brings new greater opportunities to those who move with it, Wagner, as in the past, is glad of any opportunity to be of even greater service to those associated with it.

Easy and clear explanations of the design features, construction details, ratings, operating characteristics, applications, etc. of Wagner refrigerator motors as well as other types of fractional-horsepower motors are contained in a valuable fifty-two page bulletin No. 177. It is available to all who are interested. Write to Wagner Electric Corporation, 6441 Plymouth Avenue, St. Louis, Mo.

BUNDY ANSWERS:

1. Chicago (1895)
2. Thomas Jefferson
3. It is brazed in a reducing atmosphere
4. A spot in the Atlantic Ocean
5. Fishing (trolling)

Experiments with Cooling Trains and Ships And Absorption Systems Reported at World Congress of Refrigeration

(Continued from Page 42, Column 5)

cans cooled at very low temperature where it is gradually frozen, thereby rapidly passing through the liquid state.

The chief feature of the system is that the required refrigeration is produced by an absorption machine approaching reversibility as closely as possible, according to the principles set forth long ago by ALTENKIRCH and which were developed and applied by the author in several plants of recent construction.

It is shown that this system offers interesting possibilities of heat recuperation in those cases where the raw CO₂ is extracted from coke combustion fumes by absorption in a lye from which it is then liberated by heating.

In this process, the chemical reaction is never perfect and it is required to circulate a considerable amount of solution per kg. of CO₂ produced. For efficient absorption, this solution has to be cooled down to atmospheric temperature, whereas driving off the CO₂ needs heating to temperatures higher than 100° C. Hence, the necessity of heat interchangers which have to transfer an amount of heat considerably in excess of the decomposition heat of the bicarbonate. Moreover, it is inevitable that the CO₂ carries off an amount of steam greater than its own weight. If part of this steam is condensed by heat interchange with the cold solution sent to the boiler, the hot solution returning to the absorber has to be cooled by means of some cooling water circulation system and this represents a very definite and sensible loss of heat.

In the author's CO₂ freezing system, the above considered waste heat could be made use of for the heating of the absorption refrigerating plant and would be sufficient to completely cover the refrigeration requirements.

Cooling and Freezing as Related to Meat Inspection and the Veterinary Supervision Of Food Stuff

By G. Wundram, Germany

In conformity with the prescriptions of the German meat inspection law, slightly meaty beef may be considered fit for human consumption without any restriction being laid upon it, provided the meat has been kept in brine or cold stored for 21 days.

Following research work by Schmey and Bugge showing that the meaty cysts are not always destroyed in beef after 21 days, the German Health Board, instructed by the competent Ministry, by a comprehensive series of experiments determined that the

meaty cysts in meat are killed when the temperature within the meat, as recorded by a thermometer of the type prescribed for this inspection, has been at -3° C. or lower for 24 hours. In this respect, the research by Hemmert-Halswick and Bugge, of the Berlin slaughterhouses, is very important and of great interest. By exposure of quarters of meaty meat to a strong current of air at -16° C., the meat was hard frozen within 40 to 48 hours, whilst double the time is required for the same result in air circulating at a moderate velocity. Thus, for killing the meaty cysts, operating at a temperature of about -16° C., three days are necessary, to which should be added a further 3-4 days for defrosting, so that, at the end of 7 days the butcher would receive the meat rendered sterile.

Until now, the Ottesen, Birdseye processes or the French Bellefont-Folliot process have been applied for the cold storage of fish. Experiments have just been undertaken in Germany concerning the use of dry ice aboard trawlers. The results up to the present have been satisfactory.

The Food Inspection Services are also displaying great interest in the cold storage of eggs. Experiments have been carried out in Germany on the use of the so called "cubic" crates. They have not given satisfaction, whilst the "estonian" (long crate with central division, 10 cardboard separations for 36 compartments—360 eggs and spaces of 2.5 cm. width for free air circulation) was found very suitable.

It is now recognized that germs may be found on the shells of eggs, even very clean ones. Prof. Dr. Schönbach has carried out a series of bacteriological experiments on colonies of these germs in a broth, both at room temperature and autoclave temperature. So far, 15 strains of psychrophilic bacteria have been isolated and investigated as to their biological properties. It has been found that psychrophilic bacteria may be found inside and also on the shell of stored eggs. This finding is of particular interest because, in general, such psychrophilic bacteria strongly attack the egg white.

Refrigerating Plant of Banana Carriers

By Babey, Anc. Etablissements Brissonneau et Lotz, Nantes

The "Société Générale d'Armement Maritime," subsidiary company of the "French Lines Co.," has recently had the rapid sheep freighters *Alhier* and *Ardeche* transformed into the banana ships *Carabe* and *Marigot*, intended for the West Indies service.

The refrigerating plant of these banana ships, built in the Anciens Etablissements Brissonneau et Lotz of Nantes, comprises novel and particular features, the cooling being by

means of direct ammonia expansion and not by brine circulation.

The necessary refrigerating effect is produced by 3 compressors of the patented Bernart system, each of 100,000 frig./hr. capacity.

The condensers are of the multi-tubular type having copper-coated coils. The condenser cooling water (sea water) is circulated by a steam pump.

Four air coolers, located in deck houses, each have a liquid refrigerant separator so that the compressors may be operated on the superheated compression cycle.

The distribution of the liquid ammonia to the various air coolers is controlled by novel devices. Use is made of a Bernat apparatus ensuring the automatic regulation of the liquid removal from the condenser and avoiding any direct passage of condensed gas between the condenser and evaporator.

The use of high-speed compressors and the adoption of direct expansion has made it possible to build a refrigerating plant of particular light weight and compactness.

Refrigerated Railway Transport in France

By M. Malatier, France

In France, developments in refrigerated railway transport date from the war, during which a great effort was expended for maintaining the supplies of meat to the armies.

Since 1919, refrigerating equipment has been adopted to commercial requirements. An increasing use of refrigeration is being made in the transportation of perishables, notably milk, sea fish, fresh, chilled or frozen meats, fruit and vegetables, dairy produce.

French refrigerator and isothermal cars, actually numbering more than 3,000, are characterized by heavy insulation of the walls, usually by cork board. Cooling is by ice. Special arrangements exist for the transportation of certain foodstuffs (meats, fruit and vegetables, etc.) as well as forced-air circulation devices. In connection with sea transport, refrigerated containers are used, of the same constructional principles as the cars. Isothermal tank cars are in universal use for milk conveyance.

The general organization of refrigerated transport is completed by cold stores at railway terminals and collecting centres, fixed and transportable plants for the pre-cooling of loads, ice factories and depots.

The French Railways are endeavoring to facilitate, both by rapidity of conveyance and by liberal railway rates, the development of this transport. Some transport Companies organized regular services of refrigerated or isothermal cars running over determined routes on fixed days, thereby placing refrigerated transport facilities at the disposal of all users.

Cold Air Machines

By A. Stradelli
R. Istituto Superiore di Ingegneria, Bologna

The temperature-entropy diagram is of great use in the study of the working cycle of the air machine. When comparing the coefficients of performance of air machines and of other types, due account should be taken of the operating conditions in the different cases. The theoretical coefficient of performance of the air machine being equal to that of a reversible Carnot cycle working between the same temperature limits, the suitability of the air machine for practical use is dependent upon the actual performance of compression and expansion engines. Hence, the problem is to investigate all ways and means for increasing this performance.

In this connection, it is suggested to subject the compressed air, after its cooling by water, to a subcooling by means of return cold air. With ideally perfect cycles, this system would have an unfavorable effect. In practice however, its use would not only result in lower compression and expansion ratios but also produce a notable increase in performance.

The advantages of a practical order offered by air machines, such as absence of foreign working agents and simplicity, subsist whatever be the solution adopted.

The cooling liquid flows on the bottom of the plate in which the ice rink is to be produced and the water is frozen upon this liquid either by direct contact or with a thin layer of some special liquid (fluid at least at the start of the operation) interposed between the water and the

cooling medium.

An experimental rink incorporating this principle was built and tested. The results obtained and the economy of the new system are discussed.

Cold Accumulation for Mechanical Power

By C. P. J. Staal, Pays-Bas

The possibility is considered of having mechanical power produced by heat engines working between very moderate high temperatures, of from 10° to 100° C., and low temperatures of about -40° to -50° C.

The required low temperatures would be supplied by a cold accumulation reservoir containing brine-ice frozen by the application of wind or water power.

The moderate temperature heat may be derived from the outside atmosphere (-10° to +35° C.) or from various sources of waste heat. Use can also be made of inferior fuels such as wood, peat, lignite, etc.

The efficiency of the system is discussed and it is suggested that wherever forces of nature such as wind or water power are available in an intermittent and irregular way, these forces may be advantageously used for the accumulation of cold with a view to the economical production of energy.

Air Removal from Absorption Refrigerators

In a first theoretical part, it is pointed out that the efficiency of absorption refrigerating machines is so much more strongly affected by the presence of air than it is in the case of compression machines. This is due to the fact that such air has an unfavorable effect on the working cycle of the solution; it interferes with the proper functioning of the available heat transfer surfaces and diminishes the efficiency of the heat transfer process.

Discussion is given of symptoms by which the ill-effects of air in the system are evidenced. By a proper design of the different component parts, the harmful influence of any air present may be reduced, and thorough de-aeration made possible.

In a second part, the construction of de-aeration devices is discussed and the description is given of an interesting method, covered by D. R. P., for air removal from the low pressure side.

A distinction may be made between de-aeration of the component parts individually, and de-aeration of the plant as a whole. In some instances, the de-aeration of apparatus working under vacuum may have to be considered.

Liquid Lithium Nitrate Ammine as an Absorbent

By K. Gensch, Germany
The production of temperatures

below -30° C. by means of a single stage absorption machine in practice involves generator temperatures in excess of +120° C. When aqua ammonia is used, the vapors driven off have a high moisture content so that their rectification requires particular care, the more so as the temperature to be attained is lower.

At +20° C. and pressure down to 0.15 atm. abs., lithium nitrate with ammonia forms liquid compounds which, on heating, give off pure ammonia vapors practically no lithium nitrate being carried with. This makes it possible, in principle, to produce by means of single stage absorption machine without rectifier, a temperature of -65° C. (0.15 atm. abs. evaporator pressure) with cooling water at +20° C.

A pressure-temperature diagram is given for the lithium nitrate amines and also a diagram showing the reaction heats and the specific heats. These data enable calculating the energy consumption of the absorption machine for various evaporator temperatures, and to make a comparison with the compression machine. Assuming electric current at 0.05 RM/kWh, cooling water at 0.04 RM/m³ and steam at 5.0 RM. per ton, the absorption machine is found to be the more economical at temperatures below -25° C. At -50° C., the production, making for a continuously operating machine of 100,000 kcal./h capacity, a saving in running cost of 7,000 RM. a year.

The first absorption plant using this binary system was built for the SCHERING-KAHLBAUM A. G., Berlin, and has a capacity of 10,000 kcal./h at -55° C. evaporator temperature. Test results of this plant are given and the following general conclusions arrived at:

1) The lithium nitrate-ammonia system is suitable for use in absorption refrigeration plants. After some months running, the absorbent shows no change in its physical or chemical properties. It does not corrode iron.

2) When used for producing temperatures in the range -30° to -55° C., and appreciable economy is obtained.

3) In case the cost of the available steam is low in regard to the price of electric current, the saving on running cost with respect to a compression plant may amount to 80%.

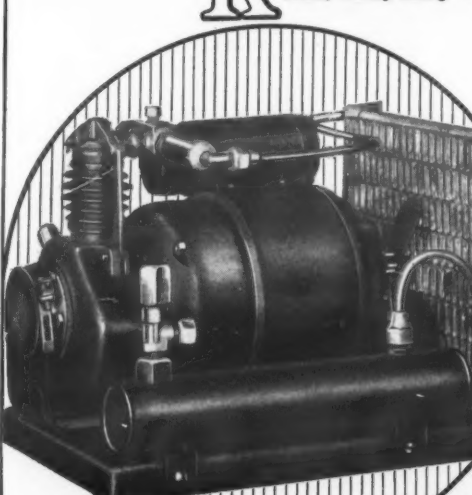
Modern Refrigerating Equipment for Wine Treatment

By R. Billardon, Cie de Construction Mécanique, Procédés Sulzer, Paris

In the course of these latter years, the refrigeration industry has found an important outlet in its application to wine treatment, principally with the object of clarifying and concentrating. Commencing with the use of brine as the liquid refrigerant and spray coolers as exchangers, engineering in this industry has evolved towards the use of direct expansion and wine circulation apparatus (under pressure) with mechanical agitation.

(Continued on Page 44, Column 1)

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The temperature-entropy diagram is of great use in the study of the working cycle of the air machine. When comparing the coefficients of performance of air machines and of other types, due account should be taken of the operating conditions in the different cases. The theoretical coefficient of performance of the air machine being equal to that of a reversible Carnot cycle working between the same temperature limits, the suitability of the air machine for practical use is dependent upon the actual performance of compression and expansion engines. Hence, the problem is to investigate all ways and means for increasing this performance.

In this connection, it is suggested to subject the compressed air, after its cooling by water, to a subcooling by means of return cold air. With ideally perfect cycles, this system would have an unfavorable effect. In practice however, its use would not only result in lower compression and expansion ratios but also produce a notable increase in performance.

The advantages of a practical order offered by air machines, such as absence of foreign working agents and simplicity, subsist whatever be the solution adopted.

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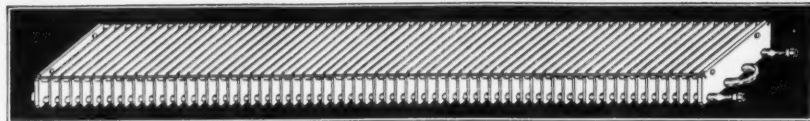
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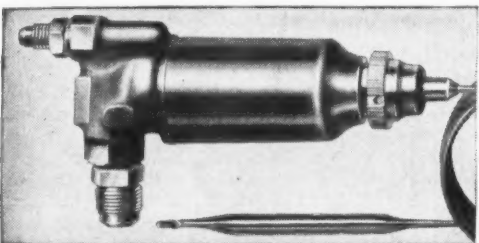
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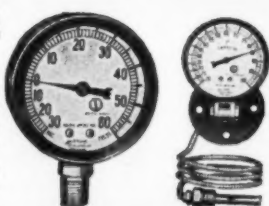
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World Congress Speakers Report Trends in Application of Commercial Refrigeration in Preservation of Foodstuffs

(Continued from Page 43, Column 5)

Moreover, as a result of this treatment method having become more widely known, and of its acceptance by minor users, a combined apparatus was developed, comprising both the refrigerating machine proper and the wine refrigerator, mounted on a wheeled chassis for easy moving to the place where used and built so as to serve for several purposes.

These apparatus have been successfully used without any modification for the successive treatment of cider, ordinary wine (clarification and concentration), port, etc. wines and alcohol. Naturally, they always have safety devices, automatic starting and regulation.

Selecting Eggs for Cold Storage with an Ultra-Violet Ray Test

By C. F. van Oyen and B. H. Molanus, Universite d'Utrecht
The usefulness of the ultra-violet ray test of eggs for ascertaining their condition (age) was evidenced by the author's research as early as 1934. Under the effect of this light, really freshly laid eggs take on a very pronounced red coloration, which for less freshly laid eggs turns to blue (see Bull., I. I. F., 1934, annex No. 12, and Doctorship thesis of B. H. Molanus, Utrecht, 1935).

It appeared then that this criterion might be of great value for the selection of eggs with a view to their subsequent storage. As was observed by Dr. Molanus, eggs classified by the ultra-violet ray test as freshly laid, keep better in cold storage than eggs which, tested under this light, are revealed to be not newly laid.

With a view to possible applications in practice, a lot of eggs which had been candled by an expert and had been declared fit for storage, was subjected to the u.v. ray test before being placed in the cold store.

After six months' storage, it was observed that:

1. of 207 eggs which had been classified by the u.v. ray test as "quite freshly laid," not a single egg had to be discarded;
2. of 1,584 eggs classified as "freshly laid," approximately 1 per cent had to be discarded;
3. of 173 eggs classified as "not freshly laid," 8 per cent had to be discarded;
4. of a lot of about 700 eggs, none of which could be qualified as "very freshly laid" when examined by means of ultra-violet rays, 15% had to be discarded.

Dealers have declared that the commercial value of the eggs at 1, on leaving storage was markedly better than that of the average cold stored egg. As regards the eggs at 2, they were also declared to be of good quality. On the whole, the eggs as at 3 and 4 were qualified as eggs of lower grade.

Sorting by means of ultra-violet rays thus allows:

- (1) avoiding loss; the eggs sorted out before storage are at that time still quite saleable, whilst this is not the case after storage.
- (2) saving space in stores; the storage of eggs which would not be in good condition after storage would be wasteful and lessen the net capacity of the stores;
- (3) improving the quality and commercial value of the stored egg delivered for sale to the public.

A New Method of Breadcooling

By D. K. Landaal and M. Koster
The Netherlands

By various decrees bakers are forbidden in Holland to sell freshly baked bread before 10 o'clock in the morning. Owing to this the "fresh-roll" at breakfast is no more to be obtained.

In order to nevertheless be able to meet the requirements of the public, experiments have been made with a view to preserving the freshness of bread by means of cooling. The principal effect of cooling is that evaporation losses are stopped and enzymatic activity arrested.

Cooling at -28° C. with the aid of dry-ice gives favorable results but it is too expensive, even when a freezing plant instead of dry-ice is used for reaching the aforementioned temperature.

The authors found that cooling at -12 to -14° C. gives entirely satisfactory results if the bread, after baking and cooling to 40° C., is subjected to an atomized water spray before being introduced into the freezing chamber. This method results in the bread being ice-coated which prevents evaporation and preserves

freshness. A description of the method is given in accordance with the patent applied for in Holland, and results obtained with it in a bread-factory in Rotterdam are reported. The following advantages are claimed for this method:

1. There is no need for baking all the bread in a short space of time before 10 o'clock in the morning. Baking can be effected in the afternoon and the bread kept in a refrigerator box till the next morning.
2. Such bread may be sold at any time, so that the bakers can deliver their customers the "fresh roll" early in the morning and are no longer obliged to wait till after 10 a.m.
3. The unsold bread can be kept in a fresh condition.

Application of Dry-Ice For Transportation of Japanese Mushrooms

By T. Mihara, T. Nagano, and S. Kato, Research Department of Nippon Shokuryo Kogyo K.K.

Japanese "Matsudake" mushrooms which grow in autumn, are collected while they are in buds and are transported to places of consumption, but on account of their extremely strong vital function, they would grow and open the "umbrella" during the transportation, thereby decreasing their commercial value to a great extent after they are delivered at the destination.

The preservation of fruits and vegetables in CO₂ gas is now in practical use, as the result of the application of the controlling effect upon their respiratory function by CO₂ gas, as was confirmed by the experiments carried out by Franklin Kidd and others.

As one of the means of utilizing dry-ice, we have made an experiment in the transportation of Japanese mushrooms, applying the controlling effect upon the respiratory function of mushrooms as well as the cooling effect produced by the gasification of dry-ice, and found that mushrooms arrived at the destination are in excellent condition and that the handling of dry-ice is very simple.

Having ascertained the possibility of putting dry-ice advantageously for the practical use, we submit hereby this report.

Preservation of Grape Juice

By Y. Cabane, Ste des Etablissements Daubron, Paris

The essential conditions to be respected in the storage of grape juice are the integral preservation of the flavor and food and therapeutic values of this product, the complete absence of alcohol and antiseptic substances as well as of any off-flavor, metallic taste or cooked taste.

A proper selection of the vine stock, the soil upon which grown and the place where processed govern the success of a grape juice concentration undertaking.

The preparation method of grape juice is briefly described, based on the effect of refrigeration during extraction, filtration and clarification, etc., and on sterilization after bottling.

It is further remarked that concentration of the juice offers appreciable advantages from economy of storage

space and transport costs. Concentration by means of the exclusive use of refrigeration makes it possible to preserve the integral flavor of the fruit.

Observations on Food Poisoning Organisms Under Refrigeration Conditions

By S. C. Prescott and L. P. Geer
Massachusetts Institute of Technology, Cambridge, Mass.

A more extensive knowledge of the effect of low or refrigeration temperatures on the types of bacteria capable of producing the so-called "food poisoning" outbreaks is of great importance in view of the rapidly increasing use of quick frozen and refrigerated foods.

Strains of *Cl. botulinus*, the various *Salmonellas*, certain organisms of the colon-typhoid group and certain *Streptococci* are of major importance in this respect.

This paper deals with:

1. Growth relations at temperatures ranging from -7° C. to 10° C. in selected types of foods, and
2. Cultural and agglutination reactions and pathogenicity tests with animals.

Extended studies have been made with foods heavily infected with spores of *Cl. botulinus*, subjected to "quick freezing," and after defrosting maintained at various temperatures with tests for toxin production at frequent intervals. Protective action of low temperature for more than thirty days even with extremely heavy infection has been demonstrated, while at higher temperatures pathogenicity is strongly positive.

Non-sporing organisms of *Salmonella* and associated types show marked variation from the standpoint of the restraining action of low temperatures, and in other respects, although these variations are influenced by the type of food under investigation and the ability of the infecting organism to adjust itself to environmental conditions.

Refrigeration Developments In Italian Perishable Export Trade

By Istituto Nazionale Fascista Per Gli Scambi Con L'Estero (I. S. E.) Italy

Vegetables and fruit (various fruits and citrus fruit) are produced in Italy under particularly favorable growing conditions, and these last few years exports have considerably increased. This result, which is also due to the efficient and disciplined action of the Fascist Government, has strengthened the importance of these exports in the Italian economic system.

An important part of these exports—almost one million quintals in normal years—regards stone fruits, very perishable species and produced in summer. Their transportation under refrigerated conditions is being employed more and more.

Consequently, the practice of pre-cooling and storage is widely spread but, because of the particular character of this produce and its being rapidly taken up by consumers, storage is of very short duration. It is called in for more easily overcoming the transitory periods in which markets are not so profitable.

In some few years time, a well developed refrigeration equipment has been set up in Italy, intended for facilitating the export traffic of vegetables.

(Concluded on Page 45, Column 1)

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World Scientists Report Results of Research With Refrigeration on Fruits, Vegetables and Flowers

(Continued from Page 44, Column 5)
table and fruit produce. From 1930 to 1934, five large stations have been erected along the route of the principal lines serving the most intense traffic. In 1935, these establishments alone have ensured the cooling of 400 cars. A total of 17,000 refrigerated cars has been sent outside Italy during this year, almost all of them loaded with fruits.

During the same period, 49 stations distributed over the most important producing districts have been equipped for pre-cooling cars of fruit and vegetable produce by means of transportable electric devices.

The State Railways have considerably increased the number of available refrigerator cars; it now comprises over 3,000 units perfectly equipped for the requirements of the trade in question.

Investigations are being carried out in Italy for the appropriate regulation of the plants and the applications of refrigeration, in general, to the fruit and vegetable trade.

Activating Effect of Ripened Fruit on Neighboring Fruit

By L. Fontanel, France

It has been observed that fruits placed in the proximity of very ripe specimens ripen much more rapidly than fruits stored in the same cold room but at greater distance. This is not a suffocation effect, since the CO₂ given off has a maturation-retarding action. The activation effect appears due rather to volatiles, the phenomenon being particularly apparent when the ripe fruits emit their characteristic smell.

The means for counteracting this effect have been investigated.

Strong ventilation is ineffective and rather prejudicial. Constant air renewal implies an increased refrigeration load, which hastens the maturation of the fruit and promotes desiccation.

Ozonization has not appeared desirable; ozone can but accelerate the basal metabolism and, consequently, shorten the life of the fruit.

Removal of the volatiles given off by absorption on active charcoal was investigated. In a room of 300 cu. m. capacity, it was found possible to eliminate the undesirable gases and smells with an apparatus containing 70 kg. of active charcoal, without accelerating the air renewal nor modifying the CO₂ content of the air in the room.

The author intends to continue these investigations and hopes for the collaboration of French and other laboratories in the study of the causes and effects of the activation phenomena in question and the remedies for counteracting them.

Cold Storage of Apples

By H. Kessler, Station Experimentale de Wädenswil, Suisse

One of the most difficult problems in the storage of high class apples resides in the too great number of varieties. It is considered necessary to scientifically investigate for each variety its storage aptitude and optimum storage temperature, so that minor rural landowners may be led to select for growing a restricted number only of the most suitable varieties.

Wastage factors are discussed more in particular with regard to Swiss grown apples. Tests have shown that, in practice, even at temperatures down to about 0° C., mold attack plays an important part. The *Gloeosporium album* strain is able to cause great damage at -1° C., and there is experimental evidence that this mold is much more cold-resistant than, for example, the species causing deterioration in American fruit. This would explain why the results obtained in Switzerland are very often less favorable than those obtained in America or England. Climatic conditions have also a strong influence on the composition and activity of the microscopic flora. In rainy districts, there is a greater danger from rot, which is still aggravated by the fact that the protective skin of the fruit usually is not sufficiently well developed. Ozone may be considered as an efficient means of mold destruction during storage.

Among the non-parasitic diseases, internal breakdown may be cited as dangerous. It becomes the more noticeable as the temperature is lower. Fruits which during their growth have been subject to sudden climatic changes, and fruits coming from trees too heavily pruned back or having had too much nitrogen manure, are particularly liable to internal break-

down. Wastage on this account may be reduced by a proper selection discarding those varieties affected by low temperatures.

With a view to satisfactory cold storage results, it is therefore required: (1) to carefully take account of the local growing conditions; (2) to eliminate such growth factors as might unfavorably affect the subsequent storage life of the fruit.

Research on the Nitrogen Storage of Fruits and Vegetables

By E. Emblick, Kaketechnisches Institut der Technischen Hochschule, Karlsruhe

Some patents claim that fruit placed at low temperatures in an atmosphere of low oxygen content and high nitrogen content, can be kept longer than in ordinary air at the same temperatures. It remained to verify by experiment whether the weak oxygen concentrations, which inhibit the growth of moulds, do not cause disturbance of the physiological order in fruit.

With a view to obtain more comprehensive data on these effects, both the species of fruit and the oxygen concentrations were varied in the experiments. At the same time, the changes were observed which appeared during different storage periods in the course of cold storage and after leaving the stores. The storage temperatures were around +3° C. and +15° C. for comparison. Apart from visually apparent modifications, the carbon dioxide given off by the fruit was chosen for judging the changes having taken place. In the experiments made with strawberries, raspberries, tomatoes and grapes, it has been found that gas storage at low oxygen concentration offers no advantage, because the decrease in the oxygen pressure required for inhibiting mould growth already entrains an appreciable loss in flavor and taste. As regards quetsche plums, green beans and blackberries, storage in a weak O₂ concentration brings about a marked improvement in the keeping qualities without there being any changes of a physiological order. For the category of foodstuffs, it is very remarkable that, in pure nitrogen the production of CO₂ is appreciably weaker than in air, whilst for fruit which is unsuitable for nitrogen storage, respiration only lessens very slightly in an atmosphere in which the O₂ concentration is lowered.

For judging whether a fruit is suitable for nitrogen storage, it would be possible to take as a basis the ratio between the CO₂ produced in the pure nitrogen and the CO₂ given off in air. When the ratio is about 1, nitrogen treatment is unsuitable. Inversely, if this ratio is decidedly below 1, for example 0.1, storage in atmospheres rich in nitrogen offers favorable perspectives. This is applicable both for temperatures of +3° C. and +15° C. In an experiment on apples, the growth of moulds was prevented for closer observation of the effect of the atmosphere on physiological changes.

On this occasion, a particularly careful study was made of the respiratory curve when the fruit under experiment was placed in store.

The Influence of Climate And Storing Conditions On Flower Bulbs

By E. Van Slogteren, Laboratorium voor Blaembollen-Onderzoek, Lisse

The flowering-capacities of flower-bulbs e. g. of Hyacinths, Tulips and Daffodils largely depend on the influence of the climate during the growing-season on the field as well as during the so-called resting stage of the bulbs from the lifting time till the forcing-period. This implies that not only the climate of the country in which the bulbs have been grown, but also the climate of the country where they must flower and in no less a degree the climatic conditions of the countries they have to pass on their way to their ultimate destination is important for the flowering-results of the bulbs.

The first improvement for the capacity for early forcing, the Dutch bulb-growers have attained by planting the flower-bulbs in the South of France, where they flowered earlier than in Holland, could be lifted earlier and in consequence of this shifting of the periodicity, could be forced at an earlier date.

It was the ingenious idea of the Dutch bulb-grower N. Dames about thirty years ago to lift the hyacinths prematurely and to expose the bulbs to artificial conditions through which

to a great extent he became independent of the whims of the natural climate. In this way he laid the foundations of the modern methods of preparing the bulbs for early forcing, by which the period of demand of flower-bulbs has been greatly extended. At the same time he solved to a great extent the problem of influencing the periodicity of plants, before the official scientists were hardly aware of it.

Along these principles in cooperation with the bulb-growers Science has succeeded in improving the forcing capacities of many flower-bulbs to such an extent that the export of flower-bulbs to many parts of the world has greatly increased. Important work in this direction, especially on the morphological development of flower-bulbs under varying storing conditions has been done by Blaauw and his co-workers.

In the laboratory for bulb research at Lisse especially during the last ten years together with the morphological development the biochemical processes, the respiration and their connection with the phytopathological problems have been studied. By this work i. a. it has proved possible to get the Daffodils in flower about 5 to 6 weeks earlier than normally. Special attention also has been given to the influence of low temperatures and the humidity of the air on the outer appearance of the bulbs, so important for the trade, as well as to the retardation or deformation of the flowers by too high temperatures during or after the shipment of the bulbs (so called heating in transit).

Low Temperatures Allow Accelerating or Retarding the Flowering Phase of Plants

By I. Luyten, Labor. voor Plantenphysiologie, Wageningen

Low temperatures allow accelerating or retarding the flowering phase of plants.

Tulips, narcissi, hyacinths and irises, with the object of accelerating flowering, should for a fairly long period during their growth be treated with low temperature, respectively varying from 7 to 13° C., and this precisely at the period when such temperatures can only be obtained by mechanical refrigeration. This process is practiced especially for *Darwin* tulips (according to the indications published in 1926 by Prof. Blaauw), but the acceleration of narcissi, hyacinths, and irises is suitable also for application on a large scale. In passing let us mention that the lily of the valley, after having been cold stored at low temperatures for a few weeks (2° to +0.5° C.), may also successfully flower under the forcing.

The object of the change in the flowering season of hyacinths and tulips is for making these bulbs suitable for growing and flowering in the southern hemisphere (South America and South Africa). The seasonal difference between these countries and ours is of the order of six months. Consequently, it is necessary to retard the growth of these bulbs by six months at least. This is done, as soon as these bulbs are lifted from the soil, by low temperature storage (for hyacinths: 3° - 5°; for tulips, -2°-0°).

Equally, bulbs may be shipped for the Netherlands Indies, but in such case they must be shipped immediately after being lifted from the soil, i. e. in July, in refrigerated holds (temperature as above). On arrival, a part of the growth afterwards should be carried out at low temperatures (13°-17°).

Low temperatures equally are of importance for the seasonal treatment of iris bulbs. Thus it is possible to prevent bulbs of certain size from flowering, which is required for their cultivation.

Consequently, low temperatures play an important part in the resolution of many cultivation problems, and for this reason they are indispensable to cultivation in all climates.

Accelerated Germination Of Seeds by Means Of Refrigeration

By A. Cecchetti, R. Istituto Superiore d'Ingegneria, Padova

Experiments have been carried out on vegetable seeds so as to investigate whether in practice the stimulating action of low temperature can be utilized for obtaining precocious germination and, consequently, precocious plants. Special attention was paid to determining the most favorable conditions for each species under consideration.

The conclusion is that each species requires special treatment as regards the length of time refrigeration is to be applied. The effect is stronger and more rapidly obtained when the seeds are cooled, not in the resting state, but after soaking in water for about twenty-four hours, i. e. after the chemical processes preceding germination have commenced.

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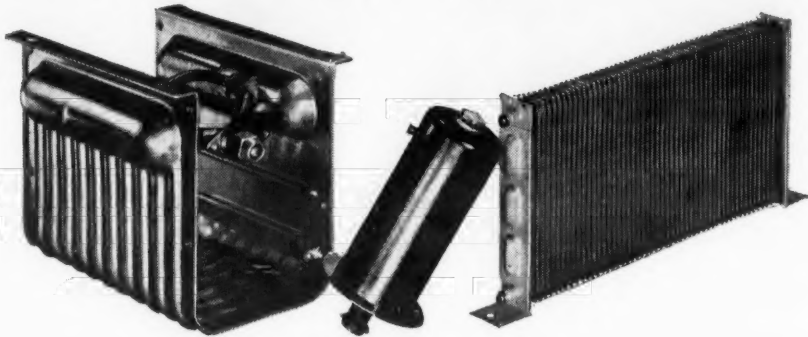
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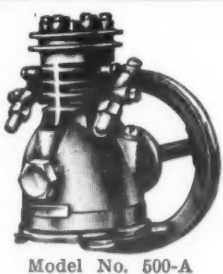
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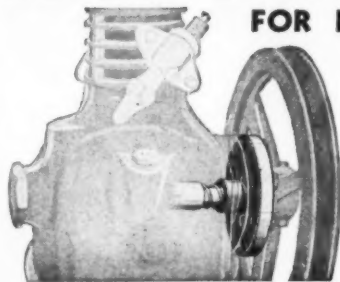
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801 W. Madison St. Chicago, Ill.

ACMA Working for Adequate Standards For the Industry

(Concluded from Page 40, Column 5)

ditioning is, the equipment operator also needs to be furnished with adequate instruction and some degree of supervision, to insure the proper operation of the air-conditioning equipment in his charge, to the end that it may produce, as nearly as possible, the optimum conditions for which the installation was designed.

Too often it is found that a building engineer, with more enthusiasm for his air conditioning plant than discretion in its operation, will operate it to a point where inside temperature conditions result in such wide divergence from outside conditions that discomfort results. This is particularly true in cooling applications.

This is a problem which the manufacturers of air-conditioning equipment recognize and are planning to meet.

ACMA Makes Progress

There is no doubt that equipment manufacturers also will require some education so that they will more readily realize that it is to their own best interest to adhere to standards of production, rating, installation, and application, broadly formulated without regard to any narrow product classifications and in the interest of the industry as a whole.

The Air Conditioning Manufacturers Association, whose membership consists of leading manufacturers of air-conditioning equipment in the United States, has been in existence only slightly over two years, but has already made remarkable progress in preparing a foundation on which the industry may build soundly for the future.

Aims of Program

From the beginning, its program has been based on the realization that three major arteries, interdependent on each other, must be developed equally to maintain the industry in a healthy, vital growth, for the neglect or disproportionate development of any one of these life streams would cripple the industry body.

Engineering, research, and design is the first of these arteries; standardized product manufacturing, based on sound and exhaustive engineering studies, is the second; and the sale and proper installation and servicing of a soundly-engineered and well-manufactured product is the third. Public confidence and continued acceptance of air conditioning are equally dependent on all three.

The purposes of the Air Conditioning Manufacturers' Association, as stated in its Constitution and By-Laws, are:

ACMA Purposes

To promote, in every lawful manner, the common interests of the members in manufacturing, engineering, marketing, safety, transportation, and other industrial problems.

To develop and establish engineering standards covering, among others, 1. design and rating of equipment and 2. application.

To collect and disseminate information of value to its members and to the public regarding products of the industry.

To encourage advancement and improvement in all branches of the industry by the promotion and support of investigations, experiments, standardization, research, and the collection and distribution of statistics and information of value to the members.

To undertake, promote, and carry on other activities in the advancement of the common interests and well-being of the members.

Association Activities

To date, most of ACMA's activities have been in the field of summer air conditioning. Much of the research work has been carried on in the laboratories of the member companies of the Air Conditioning Manufacturers Association, and the knowledge gained has been generally made available through the Technical and Code Committee of the Association.

This cooperative exchange of knowledge has been the basis for much of the progress made by ACMA in its standardization program. A particularly notable example of this standardization work is the recently released "Proposed Standard Method of Rating and Testing Air-Conditioning Equipment," which was formulated under the sponsorship of the American Society of Refrigerating Engineers by a joint committee composed of representatives of interested technical and trade associations.

This same joint committee was responsible also for the formulation of the "Proposed Standard Method of Rating and Testing Mechanical Condensing Units," and both these standards have been generally approved and largely adopted by the industry as a whole. The scope of the "Pro-

posed Standard Method of Rating and Testing Air-Conditioning Equipment" covers both summer air conditioning and winter air conditioning.

Standards Already in Use

These standard methods are already being placed in practical use to meet the problem of variance in published equipment ratings and capacity claims. Further standards now being formulated will deal with the application, design, and installation of air-conditioning equipment. Also, studies have been initiated which have as their object the formulation of a model code for use by municipalities seeking legislative control of air conditioning installation and operation.

Other branches of ACMA work, in addition to technical and production matters, are carried on by a number of active committees dealing with advertising and public relations, and standards of ethics and competence within the industry itself and in the merchandising of the industry's products. The whole program is coordinated through a Board of Directors elected by the members of the Association.

Technical Research

A number of other technical and trade associations also are making valuable and cooperative contributions to the welfare and progress of the air-conditioning industry in the United States. The American Society of Refrigerating Engineers and the American Society of Heating and Ventilating Engineers are the two leading technical associations which have been in the forefront of the work.

Consulting engineers and contractors' associations are also rendering fine assistance to the common cause.

Notable in the field of winter air conditioning have been the research and development activities of the National Warm Air Heating Association. This latter association has been responsible for excellent research work carried on in cooperation with the American Society of Heating and Ventilating Engineers.

These two organizations have maintained a research laboratory at the University of Illinois, and the National Warm Air Heating Association has provided a residence at the University of Illinois in which winter air-conditioning experiments are conducted. This work is financed by the contributions of association members.

Public Confidence Goal

To discuss air conditioning as an industry in the United States, in even its major aspects, in a brief presentation such as this brings many difficulties. The industry is so broad in character, its implications for the future are so vast, that the writing of several volumes would be necessary to approach anything resembling an adequate outline.

Each phase of the industry has countless ramifications, all of them interesting and provocative of thought. With the industry rapidly growing and developing along broad lines, almost anything which may be written today will be as out-of-date as yesterday's newspaper a month hence.

But one thing is certain and fixed and that is the determination of the air-conditioning industry to so conduct itself that it may attain the high place in American industry for which it feels it is destined.

With that end in view, nothing is being overlooked to maintain and foster public confidence in and desire for controlled weather conditions. Only in that way can there be an increasing volume of manufacture and profitable sale of the industry's product.

Classified

RATES: Fifty words or less, one insertion, \$2.00, additional words four cents each. Three insertions \$5.00, additional words ten cents each.

PAYMENT in advance is required for advertising in this column.

REPLIES to advertisements with Box No. should be addressed to Electric Refrigeration News, 5229 Cass Ave., Detroit, Mich.

POSITIONS AVAILABLE

EXCEPTIONAL OPPORTUNITY as district sales representative with nationally known coil manufacturer. Consideration will be given men with experience in contacting jobbers and distributors of electric refrigeration. We have openings for several capable men who know the commercial business thoroughly. Must be able to sell, teach men how to sell, organize and manage territories and make them produce. Prefer men located in any of the following territories: New York, Pittsburgh, Dallas, and Minneapolis. Compensation: salary, expenses and bonus. Full particulars regarding experiences and references must be given in first letter which will be held strictly confidential. Box 836, Electric Refrigeration News.

SALES MANAGER wanted by well known refrigeration manufacturer. This is a highly desirable position with a substantial concern. Applications will be received in confidence by F. M. Cockrell. If your qualifications do not meet the

requirements specified by the advertiser, or if the job and salary do not conform to your stated demands, he will return your application. Only those which appear to be suitable will be transmitted to the manufacturer. Address your letter to Box 839, Electric Refrigeration News.

ADVERTISING and SALES PROMOTION position open for a young man who has had a few years' experience with a manufacturer or advertising agency. Must be imaginative and resourceful, with knowledge of printing, engraving, catalogs and sales literature. Location, Detroit. Address Box 840, Electric Refrigeration News.

EQUIPMENT FOR SALE

RECONDITIONED Refrigerators for sale. Kelvinators \$29.00, Fridigaires \$39.00, Copelands \$38.00, Crosleys \$59.00, General Electric \$69.00, Electrolux \$59.00. Also "AS IS" refrigerators from \$15.00 up. Refrigerators for restaurants, 8 to 18 foot, displayed at our showroom, 160 West 34th Street, New York City. PILGRIM REFRIGERATION CO., 43-47 39th Place, Long Island City, N. Y.

DEALERS AND SERVICEMEN—Used refrigerators thoroughly reconditioned and resprayed or "as is". In this lot are a wide assortment of models and sizes of the following popular makes: Fridigaire, Norge, Kelvinator, Copeland, Majestic, Rice, Gibson and Crosley. All of the above priced at exceptionally low prices for quick cash disposal. Box 837, Electric Refrigeration News.

EQUIPMENT FOR SALE

SEVERAL USED & some new electric refrigerators, cabinets, units, motors, controls, commercial & domestic, brine tanks, condensers & receivers, 1/2 h.p. Fridigaire self-contained in ice cream type stand. All priced low. Reliable merchandise. Write telling us your wants. We'll save you money. REFRIGERATION REPAIRS, 13956 Washburn, Detroit, Mich.

EQUIPMENT WANTED

ATTENTION Manufacturers and Distributors. We will purchase for cash any surplus quantity of domestic and commercial refrigerators or equipment. We refer you to the National City Bank, Gramercy Park, N. Y. C., for our financial responsibility. All transactions confidential. NATIONAL REFRIGERATOR CO., INC., 352 Fourth Ave., New York City.

FRANCHISE WANTED

WE HAVE A CLIENT located in metropolitan New York financially responsible, with the finest of ratings, with a complete selling and servicing organization, with a centrally located showroom and warehouse who is interested in taking on a line of domestic, commercial and air conditioning equipment. This client of ours has been associated with the refrigerator industry for the past five years. All answers treated in strictest confidence. WORTMAN, BROWN & CO., 351 Fourth Ave., New York City.

REPAIR SERVICE

HALELECTRIC LABORATORY is America's pioneer repair house for temperature and pressure controls. Our service, price and precision workmanship are unequalled. Ask your dealer about Warrenol for stuck-up jobs. Send us his name and we will send you a generous sample. HALELECTRIC LABORATORY, 1793 Lakeview Road, Cleveland, Ohio.

MAJESTIC UNITS; any model, rebuilt or exchanged \$20.00 f.o.b. Chicago. Guaranteed six months. All models in stock for prompt exchange. Wholesale only. REFRIGERATION PRODUCTS, INC., 122 W. Illinois St., Chicago, Ill.

MAJESTIC & GENERAL ELECTRIC units repaired. Our standard job on these units is \$20.00, giving you a six months' guarantee. We also have our \$30.00 deluxe job, giving you a two-year written guarantee. Please advise which job you want when sending your units. PENO SERVICE COMPANY, Ft. Smith, Arkansas.

GENERAL ELECTRIC and Majestic hermetically sealed units repaired and exchanged. Guaranteed work. Wholesale only. Give model when writing. All prices quoted f.o.b. Chicago. AMERICAN REFRIGERATING ENGINEERS, INC., 2257 Silverton Drive, Chicago, Illinois.

SAVE MONEY on electric motor repairs. We rebuild and rewind thousands of motors yearly for largest refrigeration firms in the East and can save you money on your motor problems. Write for our price schedule for rewinding or rebuilding motors for refrigeration, oil burners, washing machines, motor stokers, and air condition motors. Out of town motors are picked up and delivered by our motor transportation service. Write for our dealers' price list. P. J. QUINN'S SONS, INC., 166 Vernon Ave., Long Island City, N. Y.

REFRIGERATION CONTROLS, domestic types, repaired, 48 hours. Ranco pencil types \$1.75, all box types, \$2.00. Majestic \$2.50. UNITED GAUGE AND INSTRUMENT COMPANY, 436 West 57th Street, New York City.

KRACK

ENGINEERED

LIFETIME COILS AND UNITS

REFRIGERATION APPLIANCES, INC.

1342 W. Lake Street, Chicago

Patents

Issued Aug. 18, 1936

2,051,110. REFRIGERATION APPARATUS. Lewis R. Smith, Pittsburgh, Pa., assignor to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Application Aug. 3, 1933, Serial No. 683,534. 1 Claim. (Cl. 62-115)

2,051,132. REFRIGERATOR DOOR. William F. Dart, Mason, Mich., assignor to The Crosley Radio Corp., Cincinnati, Ohio. Application March 8, 1934, Serial No. 714,717. 4 Claims. (Cl. 62-89)

2,051,185. STEAM JET REFRIGERATION APPARATUS. Ernest F. Stalcup, Rutledge, Pa., assignor to Westinghouse

Electric & Mfg. Co., East Pittsburgh, Pa. Application July 21, 1933, Serial No. 681,645. 4 Claims. (Cl. 62-152)

2,051,271. SHELVING FOR REFRIGERATORS. Charles Euclair Passmore, Long Beach, N. Y. Application June 12, 1933, Serial No. 675,388. 6 Claims. (Cl. 312-183)

2,051,277. HEAT INTERCHANGER. Arthur L. Stevens, Evanston, Ill., assignor to Katherine Stevens, Evanston, Ill. Application Aug. 17, 1933, Serial No. 685,503. 4 Claims. (Cl. 257-139) (Sketch excluded.)

2,051,318. GAS-FIRED REFRIGERATOR. Mark Shoeld, Baltimore, Md. Application Oct. 5, 1933, Serial No. 692,301. 17 Claims. (Cl. 62-5)

2,051,321. REFRIGERATING MACHINE. Rene Joseph Emile Constant Vin, Paris, France, assignor to Pierre Callon, Paris, France. Application June 9, 1933, Serial No. 675,134. In France June 11, 1932. 4 Claims. (Cl. 62-115)

2,051,509. VALVE. Daniel D. Wile, Detroit, Mich., assignor to Detroit Lubricator Co., Detroit, Mich. Application Oct. 21, 1933, Serial No. 694,524. 7 Claims. (Cl. 251-27)

2,051,604. REFRIGERATING APPARATUS. Harry B. Hull, Dayton, Ohio, assignor, by mesne assignments, to General Motors Corp. Application Aug. 28, 1930, Serial No. 478,486. Renewed Oct. 10, 1932. 5 Claims. (Cl. 62-116)

2,051,723. ABSORPTION REFRIGERATION SYSTEM. Peter Kohler, Stockholm, Sweden, assignor, by mesne assignments, to Servel, Inc., Dover, Del. Original application Nov. 11, 1930, Serial No. 494,837. Divided and this application March 25, 1933, Serial No. 662,652. Renewed July 31, 1934. In Germany Jan. 24, 1930. 15 Claims. (Cl. 62-119.5)

2,051,733. COLD CONSERVER. Stanford Moore and William C. Lyons, Oklahoma City, Okla. Application Feb. 4, 1935, Serial No. 5,007. 4 Claims. (Cl. 62-48)

2,051,756. COMPRESSION REFRIGERATING MACHINE. Anton Tolk, Vienna, Austria. Application Dec. 28, 1934, Serial No. 759,569. In Austria Dec. 23, 1933. 2 Claims. (Cl. 62-115)

2,051,760. REFRIGERATION. Hugo M. Ullstrand, Evansville, Ind., assignor, by mesne assignments, to Servel, Inc., Dover, Del. Application June 7, 1933, Serial No. 674,615. 7 Claims. (Cl. 62-119.5)

2,051,769. REFRIGERATING APPARATUS. Lloyd M. Keighley, Dayton, Ohio, assignor to General Motors Corp., Dayton, Ohio. Application May 24, 1935, Serial No. 23,267. 3 Claims. (Cl. 62-126)

2,051,801. REFRIGERATING APPARATUS. Lawrence A. Philipp, Detroit, Mich., assignor to Kelvinator Corp., Detroit, Mich. Application June 1, 1934, Serial No. 728,514. 12 Claims. (Cl. 62-115)

2,051,802. REFRIGERATING APPARATUS. Lawrence A. Philipp, Detroit, Mich., assignor to Kelvinator Corp., Detroit, Mich. Application March 13, 1935, Serial No. 10,910. 11 Claims. (Cl. 62-2)

REISSUES

20,069. METHOD AND APPARATUS FOR CONDITIONING AIR. Alfred D. Karr, Newark, N. J., and Karl D. Perkins, Providence, R. I., assignors, by mesne assignments, to Auditorium Conditioning Corp. Original No. 1,904,468, dated April 18, 1933, Serial No. 528,340, April 7, 1931. Application for reissue Dec. 31, 1934, Serial No. 759,998. 17 Claims. (Cl. 62-176)

PATENTS

HAVE YOUR patent work done by a specialist. I have had more than 25 years' experience in refrigeration engineering. Prompt searches and reports. Reasonable fees. H. R. VAN DEVENTER (ASRE), Patent Attorney, 342 Madison Avenue, New York City.

Armstrong Cork Makes Sales Force Changes

LANCASTER, Pa.—Several changes have been announced in the sales organization of Armstrong Cork Products Co.

Fred M. Ritts, formerly manager of the St. Louis branch office of the company's materials division, has been transferred to Lancaster, where he will serve as manager of the high temperature insulation department.

C. W. Robinson, of the company's Chicago office, succeeds Mr. Ritts as manager of the St. Louis branch office. E. S. Penn, of the Pittsburgh office, will take charge of Armstrong's office at Albany, N. Y. R. H. Graig has been transferred from Lancaster to the Armstrong branch office at Louisville.

A. E. Pearce, of the Albany office, has been appointed manager of the acoustical department in Lancaster. L. C. Bayless, of the Greensboro, N. C., office of the company's textile division, has been transferred to the building materials division in Lancaster.

G-E Promotes 'Disposal' With Training Films

CLEVELAND—"Good Riddance" is the name of a new sales training film just released on the new G-E Disposal by the specialty appliance sales division of General Electric Co.'s appliance and merchandise department. The Disposal is the new name of the garbage disposal, or kitchen waste disposal, unit manufactured by the company.

The second film endeavors to show salesmen where to find prospects, how to cash in on national publicity on the G-E Disposal, how to tie in with current advertising and how most effectively present the "need" story to prospects.

Perflex Issues New Catalog Of Automatic Controls

MILWAUKEE—Perflex Control Co., manufacturer of electrical controls, has recently issued a catalog listing its complete line of automatic control equipment for heating, air conditioning, and refrigeration. Copies of the catalog are available upon writing to the company.

The Buyer's Guide

Suppliers Specializing in Service to the Refrigeration and Air Conditioning Industries

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Some very good territories still available

Complete Market Equipment by **KOCH**

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Write for full information, stating qualifications

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At last a general purpose case at a sensible price. Offers every advantage of the most costly cases at tremendous savings. Modern in every detail. Comes equipped with coils. Single and double duty models.

AN AMAZING VALUE

Hundreds in use. Perfect refrigeration for meat, dairy and delicatessen products and all perishables sold in food stores. Write or wire for all the facts.

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3 INCH INSULATION-TRIPLE GLASS

PUR O ELECTRIC WATER COOLERS

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Complete line of different Models and Capacities.

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Because of their outstanding advantages Dayton V-Belts have been used as original equipment on leading makes of air conditioning equipment, electric refrigerators, washing machines and other appliances for many years.

Dayton V-Belts are the logical choice because they provide silent, dependable transmission—because their powerful grip prevents slippage—because they run smoothly without weaving, twisting or vibrating.

A nearby distributor carries a complete stock of Dayton V-Belts at all



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